The Builder.

VOL. XL. No. 1963. SATURDAY, FEBRUARY 5, 1881.

ILLUSTRATIONS.

Specimen of French Bookbinding: Seventeenth Century 154
London Street Architecture: Nos. 7 and 8, Bloomsbury-square.—Mr. Chas. Forster Hayward, Architect 156
Manholes on Pipe Sewers, having Steep Gradients (Double-page Engraving) 158
"Healthy Homes," Crownfield-road Estate, Stratford, E.—Mr. William Crisp, Architect 161
Chapel of Castle Trausnichts, Landshut, Bavaria 163

CONTENTS.

A New Chapter in Art* 145
A Word or Two of Common Sense as to the Channel Tunnel Project 147
The Right or the Wrong of the Prohibition to Throw Snow into the Thames 147
Persian Architecture and Construction: Royal Institute of British Architects 148
Parsonages 149
Mr. Christian on Parsonages 151
Public Works at Athens in the Age of Pericles: Themistocles, Cimon, and Pericles as Ædiles 152
The Late Mr. B. J. Talbert 152
Bookbinding, Ancient and Modern 153
London Street Architecture: Nos. 7 and 8, Bloomsbury-square 154
Chapel of Castle Trausnichts, Landshut, Bavaria 163
Type Drawings for Main Sewering 165
Healthy Homes 165
Marietie Bay 165
House Drainage, Sewerage, and Ventilation: Civil and Mechanical Engineers' Society 166
The Standard Life Office, King William-street: Visit of the Architectural Association 167
Leicester Architectural Society 168
The National Association of Master Builders of Great Britain 168
Monolith to Record the Site of the Exhibition of 1851 168
Models for Sanitary Arrangements 168
St. Mark's, Venice 168
Sir John Soane's Museum 168
Sales of Building Land 168
Competitions 168
Obituary 169
Masons' Marks: Society of Antiquaries 169
Tenders for Public Works for the Corporation of Lincoln 169
The Board-Room for the School Board 169
Joiner's Glue 169
Protection from Frost 169
A Course of Study 169
The Ironwork of Church Windows 170
The Drainage Problem 170
Quantities 170
Bursting of Boilers 170
The Frost and Boiler Explosions 170
Vertical Tube Ventilation 170
Colour through Stained Glass 171
Church-Building News 171
Variorum 171
Miscellanea 171

*"A New Chapter in Art."**

THE confusion which exists in Greek authors between the two adjacent kingdoms of Syria and Assyria would at last seem to be on the eve of being unravelled by the aid of monumental evidence which is now being gained from explorations in the former land and which reveal its more ancient strata of civilisation. The story in the Odyssey that Memnon, the son of Tithonus and Eos, who came to the relief of the besieged Trojans, would seem to be but the last faint echo of tradition based on the former connexion between the remote East and the Troad. The ancient commentators support this theory of the far Eastern origin of Memnon, "the son of the morning" as he is called, and there does, indeed, seem to be some historic basis for the idea. By some, Memnon is said to have been sent by the King of Assyria to the aid of his vassal, Priam, king of Troy, while he is intimately connected with Susa, the capital of the kings of Elam. With the evidence which was accessible to the student but a few years ago, it was impossible to see in those traditions preserved to us only fiction, but recent discoveries would indeed seem to give some more real basis to them. The recovery of several sculptured and inscribed monuments from the Hittite or old Syrian stronghold of Carchemish, an important city on the Upper Euphrates, has restored to us an important station on the roadway which connected the cities of Mesopotamia and the shores of the Persian Gulf with the West. In our former notice on the discoveries† made on that site we pointed out how it was certain that there was a connexion between the shores of the Ægean and the Hittite city—and thence with Nineveh—and Babylon. Situated as this ancient city of Carchemish was on the upper waters of the Euphrates, it occupied a most central position in regard to the nations around and formed a centre whence radiated the chief commercial and military roads of Western Asia, connected by caravan route with Egypt, Phœnicia, and the shores of Asia Minor washed by the Mediterranean, with the more northern provinces of Pontus and Galatia, and the wealth which was borne by these routes being again distributed south by the roads leading to Nineveh and the cities on the Tigris, or to Babylon, and the shores of the Persian Gulf. It is, therefore, not in any degree surprising that the art-remains which are found at Carchemish exhibit a very mixed style, when we consider the various sources from which the local artist was able to draw his ideas. In the same way it is clear that the art and civilisation which was transmitted from this nucleus of Western Asiatic culture to the nations of the peninsula of Asia Minor would contain many traces of the mixed character of the teaching of the meeting-place of so many schools. The complex nature of some of the primitive remains found in various parts of Asia Minor, exhibiting traces of influence by more than one Oriental nation, has been a great problem to archæology, but we now find in the remains disovered at Jerablus a connecting central link between the three great art schools of the ancient Oriental world.

In our former notice we showed how that the recovery of the interesting basrelief of the nude Asiatic goddess from the ruins of the Hittite capital served to connect this sacred city of Atargatis or Derceto with the more western shrine of the Ephesian Artemis, whose worship reached such a grand and gorgeous state, under the Roman emperors, whose lavish gifts decorated the shrine of the great goddess. But the statue which now lies in one of the trenches at Jerablus has a far wider interest than merely its connexions with the worship of the Ephesian Artemis. It opens up a new study for archæology in the growth and development of the art-representations connected with the worship of the Mother of the Gods; it has a history whose earlier chapters are to be found amid the mounds of Chaldean cities, as old as the early dynasties of Egypt, or in the *débris* of the second and third cities on the Acropolis of Ilios; and it is this *cultus* which forms the basis of all or the greater part of the primitive art of Asia Minor. The Babylonian Anat (or Anatis), Istar, Zirbanit, the Hittite Atargatis, the Phrygian Agdatis, and the Trojan Ati, have all part of this same story, and their representations at the hands of the various craftsmen of the land form so many chapters in the art-development of Western Asia.

The finding of the statue of the Hittite mother-goddess among the remains of the palaces of the rulers of Carchemish and in conjunction with several other sculptured remains, enables us to form some idea of the date at which they were carved. The history of the Hittite confederation may be divided into three periods,—the early period, when the tribes were coming down from their northern home, and had come but little in contact with other nations, and were but slightly influenced by the civilisations of surrounding people; the second period was that when Egyptian influence was being felt, and contact with Egypt was consummated by the intermarriage of the royal houses of Kheta-sira and Rameses II.; the third period is that when they were in contact with the great Assyrian empire (B.C. 1200—700). The remains at Carchemish present us with a type of art which comes under the last of these subdivisions; but there are other remains now known to belong to this hitherto lost nation which enable us to see the characteristics of the two earlier periods.*

One of the most interesting statues recovered from the excavations at Jerablus is one representing a curious group of beings,—a Hittite deity and his attendant priest standing on the back of a couchant lion. The deity is represented, like the goddess before described, as winged, and he wears on his head the lofty conical headdress with horned brim, surmounted by the crescent. The priest who stands behind has a curious conical cap, but not horned, and carries a battle-axe. The lion upon which these two curious creatures are represented as standing occupies all the lower portion of the sculpture, and is in excellent preservation. The lion is lying full length upon the base of the slab, with the head upon the fore paws, which are extended outwards, the tail being curled under the body. It has, in grouping, a resemblance to the figures of the couchant lion in the sculptures of Assurnazirpal (B.C. 885) in the British Museum, but is more archaic in style and evidently earlier. The attitude of the lion is peculiar, and certainly typical of the style of art in vogue in Asia minor, as it is found in several places. The facial type of the figures here represented is peculiar, their long heads and features seeming to distinguish them most certainly from the Semites of Syria or Assyria, while the turned-up shoes indicate a mountain origin. It is extremely interesting to find that, after centuries of exposure to the air, there has been preserved to us an almost duplicate sculpture to this bas-relief from Carchemish, at Boghaz-Keni, near the Halys, the site of the great temple of the Phrygian Agdatis in Galatia. The sculptures here were first brought to notice by that able explorer, Hamilton, who visited the spot and described them and the adjacent ruins at Eyuk, which are also of great interest to prehistoric archæology. The spot was afterwards visited by Texier, and by Perrot and Guillaume, and more recently by Van Lennep, and all of these travellers have given more or less accurate drawings and photographs of the remains. The series of sculptures here consist of a number of bas-reliefs cut on the sides of a rocky glen, and the spot bears the Turkish name of Yazili Kaya, "the carved rocks." The area enclosed in this recess is very irregular in shape, and would quite preclude the idea of its being the remains of any rock-cut temple, as the sides are formed not of the regular walls of a cleft, but simply by the accidental arrangement of a number of large limestone boulders of various heights, sizes, and shapes which have been utilised by the sculptors to carve the strange scenes. The faces have been roughly prepared for the cutting of the sculptures, but the whole appearance of this glen is that of some rude temple of a nature goddess wild and suitable to the orgies connected with

* See vol. xxxix., p. 402. † Ibid.

* The monuments at Jerablus exhibit no traces of forms found in the art of the late Assyrian empire (B.C. 721-625), but resemble that of early middle (B.C. 900 to 800).

the worship of Agdatis and the Phrygian Adonis Atys. On one of the largest sculptured scenes here we have represented a group of figures * bearing a most striking resemblance to the group on the bas-relief from Carchemish. On the left hand field of the sculpture we see represented a king wearing a costume similar to the winged deity at Carchemish. He wears on his head the conical and horned head-dress, a short tunic, and turned-up shoes, and similar facial characteristics are represented. He is represented as standing on the shoulders of two persons who appear to represent defeated kings. Behind this royal personage is an attendant not quite so gorgeous in his apparel. Both these heroes are armed with peculiar weapons consisting of straight staves with ringed knobs. The primitive maces we plainly see may be identified with the bronze and stone weapons found by Mr. Loftus in Chaldea and by Dr. Schliemann in the excavations at Troy. The heads of maces found in Chaldea were of bronze, and there are several in the British Museum, one bearing an inscription of Khammuragas (B.C. 1800), a king of the Kassite dynasty. The example of this weapon, found amid the *débris* of the Third City at Hissarlik, are principally of serpentine (Ilios, Nos. 635-6-7), and similar mace-heads have been found in Cyprus. They may be considered to bear some resemblance to the "knob-kerry" of Kaffirs of South Africa. The principal figure here, which we may conclude is a king, stands facing a female figure, evidently a priestess. She wears on her head a mural crown or modius, and the long locks similar to those of the priestess at Carchemish. The lower part of the body is clad in a long striped skirt, reaching to the ancles, and on the feet are turned-up shoes. This priestess stands on the back of a somewhat conventional lioness, or panther, as some suppose. Two other figures in this tableau call for notice before we come to consider the report of the whole. These are two figures of priestesses, who follow behind the highest priestess, and who are represented as standing on the back of a double-headed eagle with expanded wings,—a device which exactly corresponds to the eagle in the crest of the Seljukian sultans, and in the arms of the three central European powers. This curious mythological bird is represented as crushing beneath one claw a man, and beneath the other a mouse.

Now, in this tableau we see in the sculptures some close resemblance to the sculpture from Carchemish, and this connexion is rendered additionally certain when we see that each of the figures, male and female, in this scene is accompanied by a small group of hieroglyphic characters. Similar to those found in the inscriptions on the stones at Carchemish,—not only are the individual characters to be found among the characters of the inscriptions, but the same combinations preceded by the same determinative prefix,—that of divinity (?),—are to be found. Texier was of the opinion that we had here a representation of the conclusion of a treaty of peace between the King of Phrygia and the Amazons. This is hardly possible, but it more probably represents the return of some Hittite or Phrygian victorious king, who is met by the priestesses of the Asiatic goddess, whose shrine was in this wild spot among the rocks. This group of priestesses of the Asiatic goddess of the Phrygian or Galatian people presents all the curious mixture of art which we might expect from its connexion with Carchemish. We find the modius or corn-measure worn as a head-dress by the priestesses of the goddess as indicative of the telluric character of the goddess who, in after time, became the Hellenic Cybele. The origin of this curious but very characteristic head-dress has hitherto been unknown, but we believe that it may now be considered to be of Babylonian origin. In the Musée du Louvre, at Paris, there is a most valuable relic of early Babylonian art in the shape of a statue of the mother goddess. This statue was dedicated by Kudur-mabug, king of Elam, and his son, Eri-Aku, the Arioch of the Bible (Gen. xiv.), to the goddess, and the dedicatory portion of the inscription is as follows:—

> "To the Lady of the mountain
> Giver of fertility
> The exaltrice
> Daughter of the Moon God
> Their lady."

The rest of the inscription refers to the building of the temple of the goddess, and the titles of Kudur-Mabug and his son.* The figure is a most remarkable object of primitive art.† The figure is partly nude, all the breasts and arms being bare, while the lower portion of the body is covered by a skirt. On the head the usual head-dress is replaced by a basket full of corn. In this emblem and statue we may see the earliest form, therefore, of the representation of the telluric deities, and the origin of the modius or corn-measure. It is evidently the same goddess to whom the title, "Corn I increase, food I make good," is attached in one of the long lists of divine attributes in the museum. The monuments which have been recovered from Carchemish, or those from Babylonian cities, do not as yet furnish any intermediate stage in this emblem, but we may, no doubt, obtain it in the course of further explorations. But its Babylonian origin would appear to be certain. The double-headed eagle here represented as killing the mouse must be an early emblem of the Apollo Smintheus,—"the mouse-killing Apollo,"—whose worship was connected with the Teucrian allies of the Hittites, and we may compare his double-headed type with the two-headed solar deity, Janus, of the Romans. The Babylonian solar war-god, Nergal, to whom the eagle was sacred, had a dual character as the day and night sun,‡ which may have been represented in a somewhat similar manner. The sculptures here figured show clearly the connexion between these sculptures and the mythological conceptions of Babylonia. On two of the rocks § we have a two-winged lion, headed figures of men, which are evidently derived from the composite characters of Babylonian art.

Some of the figures here sculptured are very important, as they furnish to us the more native art upon which the Babylonian or Assyrian influence was grafted. On two of the sculptures we have represented a priest, probably one of the Curetes, the priests of the Phrygian goddess. He is clad in a long robe, of most peculiar cut. In front a species of frontal or apron falls over the robe; this must be a similar robe to that represented on the black basalt statue found at Jerablus, but in this latter case it is a full-faced representation. On the head is a skull-cap, fitting close to the head, and having a frontlet of three bands. The type of the face is very remarkable and interesting, as it resembles so closely the face of the eunuch officers of the Assyrian kings, and would seem to confirm the theory of the class of emasculated priests of the goddess. The adjacent sculpture, on another rock, furnishes us with a very interesting group, representing a deity, clad in almost similar costume to the priest, but wearing a more lofty and ornate conical head-dress. This curious individual has his arm placed round the neck of a young boy whom he holds by one hand. It would seem that we have here represented the defied King Man, Men, or Manes, and the boy Atys,—the Phrygian Adonis, whose worship was accompanied by such wild orgies. It is interesting to note that the hieroglyphic group which accompanies this sculpture is found on the black basalt stone in a mosque at Aleppo.

One other point which is to be noticed is this, that although there are on these rocks at Boghaz Keui and on the sculptures from Carchemish representations of Hittite deities, kings, and warriors, in no case is a long sword to be seen as worn by the persons, only long daggers or dirks. This would seem to place these remains in the same epoch with the antiquities found in the prehistoric cities at Hissarlik, where no sword has been found, only long daggers, while at Mycenæ, which belongs to a more advanced period, numerous swords were discovered.‖ Of the sculptures which adorn the walls of this most wild and rock-built temple of the Asiatic goddess there now remains one most remarkable example to be described,—a figure of the Lydian Hercules, representing all the strange combinations of fanciful idealism and symbolism. Here we have a most remarkable example of the Heracles Leonteios or "the lion-formed Heracles," a type which, in after time, became the Heracles covered simply with the lion skin. The sculpture here represents a most complex style of work. The upper part is the head of a human being, turned side face over the shoulder; the usual lofty head-dress indicates the rank of the wearer. The figure has no arms, but the shoulders are replaced by two figures of the head and fore pare of two lions, while the hips and lower part of the body are represented by two full-length figures of lions, one on either side. It is, indeed, curious to note in this complex figure how the sculptor, while blending all these extremely conventional characters, has managed to retain some of the forms of the human figure; the feet and lower extremities are not indicated. The sculptures here carved in this remote glen in the Amazon land, in the land where were performed some, at least, of the labours of the great Heracles exhibit features which cannot but be of interest and value to the student of the earlier chapters of art. Here we see a native base style which has been brought in contact with and influenced by the more developed style of Babylon and Assyria. We see here modified types and representations of mythological characters familiar to us from the primitive sculptures and gems of Chaldea, and we see also a clear art and palæographical connexion between these early artists and those who carved the bas-reliefs at Carchemish. The inscription discovered by Major Wilson at Gurrun, and by Sir Henry Layard at Malatiyeh, on the Upper Euphrates, served to mark the road which connects the Hittite stronghold with these remote cities of Phrygia, and there is but little doubt that, were explorations made along the route thus indicated the pathway by which the influence of Babylonia and Assyria was spread westward will be more clearly indicated still.

In the consideration of these early remains of the Pre-Hellenic civilisation of Asia Minor, it is indeed fortunate that we have some remains of an earlier period which serve to show the more primitive style upon which the imported styles of Assyria or Babylonia were grafted. The monuments on the walls of the primitive palace of Eyuk, a short distance from Baghaz-Keui, evidently belong to an earlier period of art, as but little Oriental influence is to be seen on them, and as yet no trace of the Hittite writing has been found. Here we find all the peculiarities of dress which served to distinguish the local character of the sculptures at the more eastern sites, but little or no trace of more Oriental influence. One point of great interest is to be noted,—that is, the remarkable fidelity of these sculptures in the representation of domestic animals. The sheep at Eyuk, and the animals' heads in the inscriptions, among which we may note the sheep, ox, ass, antelope, and goat, are all most remarkably accurate. The attempt which has been made to carve a lion on one of the black granite blocks at Eyuk is a most lamentable failure, it being almost as grotesque as some of the Japanese works of art. The total disregard of all rules of perspective and proportion which is exhibited in these sculptures would certainly indicate that we have here records of an earlier period than those at Baghaz-Keui or Carchemish. The carving of these bas-reliefs at Eyuk, which adorn the walls and corridors of the palace which once stood here, is peculiar, and calls for some remark. The carved portions are all level with the surface of the stone, and the work has evidently been marked out, and then the back-ground cut away. A similar mode of workmanship is seen in the cutting of the inscriptions at Carchemish and Hamah.

The crude art which is exhibited in the sculptures at Eyuk is, however, a great advance on that which is exhibited on the idols and vases of at least the two lowest cities unearthed by Dr. Schliemann at Troy. These rude attempts to depict the human form are "more elementary than Shakspeare's manikin made after supper out of a cheeseparing." But, as Professor Newton justly remarks, "that which gradually converted this manikin into an organic form was the instinct of Greek genius trained and developed by the contact with more civilised races around, and imbibing ideas of Egyptian-Assyrian art through traffic with the Phœnicians."* These primitive idols of the stone age inhabitants of the first of the settlements on the hills of Hissarlik are as unartistic as the attempts of some of the fetisch-worshipping savages of the Southern Seas. Yet, rude as they are, they form but the first dawn of an artistic conception which gave rise in far distant years to some of the grandest conceptions of Greek art. But one of the most remarkable finds which that ardent explorer has made amid the *débris* on the Acro-

* E on Perrot's plan of the rock sculptures.

* This statue dates about 1900 B.C.

† It is clearly a bronze cast, as it has not been cleaned from the mould, and the line of the mould can be seen.

‡ As the god of the "nocturnal sun," it was his mission to go and fight against the powers of death in the under world.

§ L and M. ‖ Schliemann's "Ilios" p.834.

* Mr. Newton's lecture before the Society of Antiquaries, April, 1874.

polis of Hissarlik, is the lead idol found at a depth of 22 ft. below the surface in the ruins of the third or burnt city. Here we have a representation * which bears so close a resemblance to the Hittite figure at Carchemish, that one wonders if any connexion could have existed between the city on the banks of the Euphrates and the "golden city." Here we have the nude figure of the goddess, as at Carchemish, with hands clasping the breasts, the long pendent locks, and all the characteristics of the "mother goddess." The conical head-dress with its lunar emblem is not found, but it appears shortly after in the later development of the representation. An examination of the figures and pottery unearthed by Dr. Schliemann cannot but convince us that there is a symbolic connexion between the idols and the ord or human-headed vases. In the vases, the conical cover often surmounted by a horn, as in Nos. 227, 234, 236, would certainly seem to represent the head-dress of the Hittite goddess, while the projections or appendages, such as are so prominent in the vases of the third city, as in No. 349, would seem to be derived from the wings.

From the remains which have now been recovered from the sites which we have noticed in this *resumé* of some of the most recent discoveries, one point is clear,—that at a period earlier than has hitherto been supposed by archæologists, the western parts of Asia Minor were brought in commercial, and later in military, contact with the people of North Syria, and from them obtained certain art conceptions and forms which they developed in after-time. It is also clear that this contact was not solely due to the Phœnicians, as has so long been supposed, but that the caravans which passed from Carchemish, on the Euphrates, threaded their way through Central Asia Minor, and bore the learning and wisdom of the Chaldees to the shores of the Ægean. A lasting record of these early pioneers of civilisation is preserved in the rock-cut statue and inscription in the glen of Karabel, near Smyrna, and in them we recognise the lost nation of the Hittites. It is to be hoped that the small number of monuments which are now known to us, and which form, as it were, so many disconnected paragraphs, may be largely augmented until the time will come when this New Chapter in Art will read as one continuous whole.

A WORD OR TWO OF COMMON SENSE AS TO THE CHANNEL TUNNEL PROJECT.

THE proposal for a tunnel under the Channel is again coming to the fore, and the chairman of the South Eastern Railway speaks of it with no little confidence. As to the difficulties of construction, of drainage, of ventilation, and of working, if finished, we have nothing now to say. Let us suppose that the advisers of the project have duly weighed these enormous physical difficulties, and see their way to overcome them. It is true that they are, each and all, of unprecedented magnitude. So far from our past experience furnishing any guide to their removal, we rather fear that the greater the experience of the engineer, the less sanguine will he be as to an ultimate triumph. But for the present we are content to approach the question as learners, and as such we should be thankful for a little information on the very prosaic subject of finance.

The South Eastern Railway, in the year 1879, had a gross revenue of 5,560*l.* per mile, the capital outlay having then amounted to 62,758*l.* per mile. Of the revenue, 70·48 per cent. was derived from passengers, parcels, and mails. How much of this was through, and how much was local, traffic there exist no means for ascertaining,—none at least accessible to the public. Working expenditure was 46·48 per cent., and net receipts from traffic were 4·56 per cent. on capital. As is unfortunately the case with English lines in general, no provision is made for *amortissement*, or sinking fund, or for in any way replacing the capital laid out in costly and perishable works or plant.

The estimate which some time since was offered for the tunnel under the Channel was 7,450,000*l.*, or more than a third of the 21,000,000*l.* which the line in question has, in round figures, cost. We have not by us information as to the exact length of tunnel which the estimate was supposed to cover. But perhaps the best way is to look at the matter per mile, as in that case a little more or less length is comparatively unimportant. And we have some information as to the cost of long and important tunnels, on which experience indeed any rational estimate of their cost can alone be based.

The Metropolitan and Metropolitan District Railways, taken together, make up about the length of twenty-three miles, which is somewhere about that of the line under the Channel. They cost together upwards of 15,000,000*l.*, the cost of the former being 640,000*l.* per mile, and that of the latter 680,000*l.* per mile. We have no other works of like magnitude to compare. But we have numerous cases of tunnels. That which naturally first suggests itself for comparison with a submarine tunnel, is the tunnel under the Thames. This work cost 1,299*l.* per yard run, taking the width of the river at 350 yards. If we calculate the cost out and out, from shaft to shaft, 400 yards apart, the price was 1,137*l.* per yard. This is at the rate of a little over two millions per mile. The Kilsby Tunnel, on the London and North-Western Railway, which, though not a submarine was still a wet tunnel, cost 145*l.* per yard. The St. Gothard Tunnel has been priced at a little less than this, but we have not the final accounts. The Mont Cenis Tunnel cost 195*l.* per yard. These precedents of expense would hardly justify an engineer in estimating a tunnel under the Channel at less than 200*l.* per yard, or 352,000*l.* per mile, being less than half the cost of the Metropolitan lines; of the price of which, however, we must remember that the cost of land formed an important, though undistinguished, portion.

To pay five per cent. on 350,000*l.* per mile requires a traffic of about 35,000*l.* per mile per annum, or more than five times that of the South-Eastern Railway. No English railway approaches the quarter of this figure, with the exception of the two metropolitan lines, which take respectively 38,600*l.* and 34,300*l.* per mile. These, it is well known, are entirely exceptional cases, fed by constant local urban traffic, with stations little more than half a mile apart. The through traffic of these lines, from Mansion House to Aldgate, is almost *nil*, and even from the angle of the loop to either terminus the through traffic is probably less than the intermediate local traffic. In the Channel tunnel there can be no local traffic. Generally speaking, it will be only the through passengers from London to Paris, and *vice versâ*, who could be depended on to feed the line. How many there are, the Company can no doubt tell; and it would be very desirable, if the shareholders are expected to promote the tunnel, that the information should be given. All that we can state positively is, that the whole of the receipts of the Company for rents, tolls, navigation, and miscellaneous earnings amount only to 173,200*l.* per year. If we suppose that 150,000*l.* of this is derived from fares of 10s. each for passengers crossing the Channel, we arrive at the number of 300,000 per annum, or about 820 a day. At our maximum charge of 3d. per mile, these passengers would pay 3,750*l.* per mile per annum, or about ten per cent. of the required revenue! And as to this, it must be remembered that the 10,000 passengers per mile per diem of the Metropolitan District line fall considerably short of affording such a revenue. Notwithstanding that, double the amount to allow for merchandise, and allow fifty per cent. for working expenses, and we get, on an exaggerated estimate, a chance of about one per cent. on the lowest estimate conceivable for the undertaking.

These are not, we allow, exact figures. But they are the nearest at which we can arrive, and the error, we take it, must be in excess as to traffic. It is in the power of the promoters of the plan to tell what is the annual traffic across the Channel,—what is the number of passengers,—and what are to be the proposed fares. If these exact *data* are given, the public may be allowed to form their own conclusions as to the probable increase that would be made if people could be conveyed for twenty or thirty miles beneath the ocean. They would also form their own opinion as to whether it would be safer to take the 337,000*l.* per mile of the Mont Cenis tunnel, the 660,000*l.* per mile of the Metropolitan Railway tunnel, or the 2,000,000*l.* per mile of the Thames tunnel, as their guide as to the probable cost of the Channel tunnel. When these matters are satisfactorily made out, it will be time enough to go into the engineering questions of construction, maintenance, working, drainage, and ventilation. Taking all these things in the most favourable light, we have to consider whether a traffic equal to that of the Metropolitan district line is rationally to be expected, under any circumstances, to arise between Dover and Calais.

* Ilios, p. 337, No. 226.

THE RIGHT OR THE WRONG OF THE PROHIBITION TO THROW SNOW INTO THE THAMES.

WE should very much like to know whether the Conservators of the Thames are within their rights in preventing the relief of the roadways of London by throwing snow into the Thames. On the first blush of the case, it strikes us that such can not be the fact. If half an inch of rain falls over London, it makes its way into the river. If the fall take the shape of 6 in. of snow, what right have the guardians of the river to prevent it from following the same natural course? Let the thermometer rise, as it did on the 26th of January, and the matter settles itself. Let it remain below the freezing point, and what justice is there in preventing the citizens from resorting to the river, in their sore need, to perform a legitimate function?

Turning, however, to the Thames Conservancy Act of 1857, we find that Clause 102 provides that "Every person who shall unload, put, or throw into any part of the River Thames, or on any shore or ground below the high-water mark of the River Thames, any rubbish, earth, ashes, dirt, mud, soil, or other matter, or allow any offensive matter to flow into the Thames, shall forfeit for every such offence any sum not exceeding 20*l.*" We confess that the words "or other matter," seem legally to include snow. We feel sure that such could not have been the intention of the Legislature; but we suppose that such may be held to be the effect of the legislation. Attention, however, should be given to clause 179 of the Act, which states that nothing contained therein shall take away, alter, or abridge any right or claim to which any owner or occupier of land on the bank of the river is by law entitled. We do not see how, in face of this clause, any owner or occupier of riparian property could be prevented from throwing snow off his own premises into the river. Still, if such be the case as to power, there yet remains the question of the wisdom of the enforcement of so vexatious, and, we take it, novel a prohibition, under all the inconveniences which are thus inflicted on London. We quite fail to see that the interest of the navigation, or of the real conservation of the river, authorise such an interpretation of "other matter." But the case assumes an aspect that, but for its inconvenience, would be simply ludicrous, when we see how the meshes of the law are so constructed as to catch the minnow, but let the pike swim through. Is it not too absurd to see the Conservators take their stand on a lucky surplusage of terms in an Act of Parliament, to prevent the proper freeing of the thoroughfares of London from snow, while at the same time they have so mismanaged as to allow the whole "offensive matter" of the sewers of London "to flow into the Thames" without stint or disguise? If this is not to strain at a gnat and swallow a camel we do not know what is. If the Conservators had been advised as other river guardians have been, we think there is little doubt that the sanitary safety of London would have been provided for in a very different manner from that which is now the case. They chose to attempt a proof of obstructions which, it seems, did not exist, instead of that of pollutions, which do. They naturally failed. It is too bad that, having from wrong tactics failed to perform that function of defence of the river for which they were originally constituted, they should turn round to exact the pound of flesh from the Metropolitan Board for throwing into the Thames, in the form of snow, that which, in twenty-four or forty-eight hours more, proceeds to throw itself in in the form of water. Mean time trade suffers, health suffers, and a sense of anger and injustice is aroused in the minds of a large portion of the inhabitants of London.

South London Working Men's College.—On Monday next, the 14th, Miss Hart will lecture on "Leclair, of Paris, House Decorator," showing he has solved the problem of the relations of capital and labour, by making all his workmen participators in the profits of the business, which is a very large one.

PERSIAN ARCHITECTURE AND CONSTRUCTION.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

At the seventh ordinary meeting of this Institute, for the present session, held on Monday evening last, Mr. John Whichcord, president, in the chair, the decease was announced of Mariette Bey, of Cairo, and of Professor Martin Gropius, Honorary and Corresponding Members.

The Pugin Studentship, 1881.—Mr. J. Macvicar Anderson, Hon. Sec., announced that six candidates had sent in drawings in competition for the Pugin Studentship for the present year, viz.:—E. Milner Allen, Fulham; F. W. Booker, Nottingham; A. Hemingway, Battersea; F. Hooper, Beckenham; W. R. Lethaby, Calthorpe-street; and J. A. Minty, Edinburgh. The Council, having carefully examined the drawings and sketches submitted, had that afternoon determined to elect Mr. W. R. Lethaby as Pugin Student for 1881. Mr. Lethaby was the winner of the Soane Medallion in 1879. The whole of the drawings will be exhibited at the next meeting of the Institute, on Monday, the 14th inst.

The Secretary, Mr. William H. White, then read a paper, the joint production of Mr. C. Purdon Clarke, architect (resident for two years at Teheran and Tabreez on behalf of Her Majesty's Government, and now in India on a mission on behalf of the authorities of the South Kensington Museum), and Professor Hayter Lewis (now in Egypt), on "Persian Architecture and Construction," commencing with the following introductory passage:—

The objects of art, with most of the drawings which illustrate this paper, were lent to me (Professor Lewis) by Mr. Caspar Purdon Clarke, who for some two years was employed by Her Majesty's Government as resident architect to the British Embassy in Persia, and who is now in India on a mission from the authorities of the South Kensington Museum. To him I also owe many valuable suggestions respecting theories of the formation and influence of Persian and other Eastern art. I am afraid that to many of the members the subject will not have much interest, for it may seem to be but remotely connected with our present work. To me, however, the study has served as a relaxation from the hard work of ordinary professional life, as it appears to show the source of the new and grand outlines practised by the Byzantines,—outlines which, in various styles, are now homely forms to us. The dome, for example, not springing timidly, as may be said even of the great Pantheon of the Romans, from a circular base, built solidly up from the ground, but raised high in the air on four great arches, whose angles were gathered up into pendentives to form a base, high above, for the dome which was to cover all. To Persia, too, whether under its various conquerors or its native race, we owe, so far as I can gather, that singular form of pendentive, the honeycomb,—one of the most distinctive features of Arab art,—and many, if not most, of the beautiful ornaments of tile work, incised marbles, and other refined decorations, which give so great a charm to Byzantine and Arab work. Through Byzantium, Egypt, Spain, and Venice, Persian art deeply influenced Mediæval work in Italy, Germany, and France; and not until the rise of pure French and English Pointed architecture did this influence pass away. It affected us again in later times. When we look upon the dome of St. Paul's Cathedral, when we consider the decoration best fitted for it, and envy perhaps the skill of Sir Christopher Wren, it will be well to remember that, some 1,300 years ago, the same form was built up in a bolder way, and its surface was decorated by the Byzantines in a manner which we are only now trying to imitate; and that these same Byzantines worked, so far as I can learn, after the hints supplied to them by the Persians.

The paper treated of the unique character of Persian history, Persia being the only one existing of the ancient great monarchies. Nearly all the accurate knowledge possessed of it, derived from personal investigation, was due to Sir R. K. Porter, Texier, Flandrin, and Coste, with such memoranda from residents in Persia (but without the assistance of drawings) as were given by Major Smith and others. The valuable essays which Mr. Fergusson had written, partly from those materials, were well known. According to him, no hiatus in architectural history was more complete than that of Central Asia during the ten centuries which elapsed from Alexander to Mahomet. A map, showing by various tints the boundaries of the Persian kingdom at different times and under different denominations, was exhibited, and a reference was made to a letter, but little noticed, of the historian Niebühr, who, long before the discoveries of Botta and Layard, prophesied that the time would come when those who lived after him would find on the Tigris and the Euphrates the origin of Grecian art and mythology. The drawings of Persepolis forming part of the University College series, were exhibited and referred to; also a drawing from the same series, of the Tomb of Cyrus, which bore evidence of Grecian art,—a fact to be explained by the constant communication of the Greeks through the Ionian colonies with Persia. That much Greek influence was at work there before the conquests of Alexander was probable, and his conquests were not mere invasions. Alexander built cities in conquered countries and peopled them mostly with Greeks. Two such cities were built on the farthest limits of his dominion, some 150 miles north of Moultan, near the scene, in our own times, of the battle of Chillianwallah; also one near Cabul, another near Candahar, two others on the Indus, and one near the modern Merv. The details of Indian work, from the time of Asoka, some seventy years after Alexander's death to the later times of the Amravati Tope, about the fourth century of our era, showed Greek influence. Analogies between the details of carvings at Persepolis and at the Sanchi Tope were referred to. Illustrations of the same were exhibited.

The paper continued with references to the dominion of the Greeks in Asia; the revolt of Bactria and Parthia; the new Bactrian monarchs, who were also Greeks, and who ruled until B.C. 120 in Cabul and Western India; the Indo-Scythian kingdom; colony founded by Trajan at Nineveh; the ruins of El Jerash (the ancient Gerasa) in the almost uninhabited land of Moab; Sassanian rule in Persia, Syria, and Egypt; the reproduction of ancient Persian forms at Ferozabad and Serbistan, &c.; the Persian plan still worked on in the Saracenic works of Syria, Egypt, and Sicily, as well as in the great commercial route from Alexandria northward to the south of France. Whether the Byzantine pendentives came from Persia it was impossible to say, but the mode of lighting domes, as at St. Sophia, was undoubtedly due to the Persians. References were made to the over-running of the Persian native empire (the Sassanians) by the Arabs, whose capital was established at Baghdad; to Mahmoud of Ghazni; to the invasions of the Mongols or Moguls; to Timor or Tamerlane; to Moghul architecture in Persia and North-western India.

The paper then touched upon the actual mode of planning and building houses in Persia, a mode which had been in use for centuries; and with regard to which Professor Lewis's words are here given in full, namely:—

The drawings which Mr. Clarke has supplied, and which I take as my text, are the ground-plan and sections of a Persian house built about 1650. It has the open court, which answers in some measure to the Roman *atrium*, though the disposition of the whole plan is unlike the Roman. Roughly speaking, it consists of a long open court, with rooms on the two longer sides. The entrance is at the end of the rooms next the road, though a small but very pretty octagonal hall, somewhat unusual in plan, and with a peculiarly groined roof, the design being described to me as like that of Beejapore, which was illustrated in the Institute Transactions by Mr. Fergusson. Out of this hall you turn sharply to the left into a passage which leads sideways into the court. By this sudden turn, the privacy of the house is quite protected,—an object which, I am sure, ought to be borne in mind more than it is in our own plans. In the centre of the court, which is paved with square tiles, is a square sinking for water and its fountain. On the side opposite to the entrance are two rooms and a kitchen. There is an upper story over some of the rooms, but in general they are ceiled only by the roof. In planning such a house, the Persian architects use paper which is ruled crossways in faint lines,—paper similar to that used in France and Germany by architects, and in this country by engineers,—the divisions representing the ordinary thickness of the walls. To speak broadly, the architect has only to draw his brush through these squares, and the workman knows just what is wanted. I need scarcely say that this method of working gives a sort of rhythmical proportion to the different rooms, and it materially assists in continuing the rectangular system of planning which has so especially characterised Eastern art from Egypt and Assyria downwards. At the same time the exquisitely beautiful manner in which, in the East, the square form is often gradually brought into the octagonal or round, by almost imperceptible degrees, takes off the unpicturesque appearance which these plans would otherwise have. To get to the upper story, the stairs are formed in a way which would seem to be likely to lead to accidents. The steps are all planned as winders, not ascended as ours would be,—round a cylinder,—but winding very little, each step being made just large enough to take one foot, so that the stairs can only be ascended and descended one way, and that way not a very safe one to an unpractised climber. A sketch by Mr. Clarke of part of the stairs of the house, the plan of which I give, illustrates this peculiar mode. I now come to the ornamental work. The surfaces, much raised, are executed in plaster, possibly stamped, but never cast. The plaster when being mixed with water is beaten up, so as to prevent its crystallising, and is at the same time mixed with a decoction of madder root or with sugar. The plaster thus treated will not harden for several days, and in order to make this paper as practical as possible I have had this method tried by an experienced plasterer. The result may be seen in some twisted specimens which I exhibit, and which did not set for several days, though without the treatment I have described they would have been quite hard in a few minutes. By retaining the plaster in this moist state, the plasterers are able to work all the ornaments by hand with great facility on the spot; and much in fact as the Italian band of plasterers who came over here at the building of Queen Anne's churches, when such beautiful work as that at St. Martin's-in-the-Fields was executed by them by hand. In a Persian living-room the chief object of decoration is the fire-place, the opening of which rises higher than in our own fire-places. The fuel used is wood, composed of long logs set up on end on the hearth. A flue leads like ours to a chimney-top, often prettily ornamented. . . . . Next in point of decoration are the windows, formed in plaster-work of beautiful patterns, the chief being that of a slender central stalk branching out into delicate conventional forms. The effect is, of course, that of a screen keeping out the fierce rays of the sun, and when filled with coloured glass, like the specimens exhibited, producing a most beautiful effect.

Professor Lewis concluded with a reference to some of the forms of Persian decorative work, expressing Mr. Clarke's opinion that they were derived from the Tartar or Chinese,—perhaps from Tartar-Chinese art,—notably the bulbous dome. The Professor, having referred to objects of Persian work at South Kensington, exhibited some specimens of ornament, and some drawings lent to him by Mr. Clarke; and he closed his paper with the following paragraph:—

I may say that Persia, invaded, conquered, desolated, in the hands of strange masters for centuries at a time, still shows, in the words of Major Smith, that "Persian art, from the earliest times until the present day has retained a distinctive characteristic style": and I will venture to say that in it are to be found outlines, colouring, and decorative work which have formed the bases of many of the most beautiful architectural forms handed down to us by the Byzantines and the Arabs.

In the discussion which followed,

Mr. James Fergusson said he should have been very happy if he could have contributed anything of moment to the very interesting paper which had been read, for it was of a class of paper too seldom brought forward. He could very much desire that more of such really artistic papers should be read before the Institute. The paper which had been read, however, erred, he thought, on the score of fulness,—it covered too much ground, and might more profitably have been treated of, and discussed, in sections. In discussing the subject it should be remembered that Persia was never inhabited by one single people. It was really the home of the three races of people who in the Bible were typified by Shem, Ham, and Japhet. There was no country in the world where architecture was of less use for the purpose of illustrating the history of the art than in Persia, as there were so many gaps to be filled. With regard to the

Moguls, he quite differed from Professor Lewis when he considered them only as the destroyers of buildings in Persia, for Samarcand was built by Tamerlane, and the Moguls also had the merit of introducing colour decoration into the country, as was to be seen in the mosques at Tabreez and other places. Indeed, the Moguls were a most artistic race, like all the Turanians. The Palace of Mashita, which had been mentioned, was certainly built by Byzantine architects, the base being of a Corinthian type. It was undoubtedly the case that while the Saracens in Spain mixed their style with a certain amount of Christian art, in Persia they incorporated with it a certain admixture of Mogul art. The Palace at Mashita had been cited in the paper as affording an instance, well worked out, of a dome with pendentives, and Professor Lewis had dwelt a great deal on the invention of the pendentive dome, as though it had been invented in Persia. He (Mr. Fergusson) could not say that it might not be so: there was no sufficient evidence to prove either view; but his impression was that the weight of evidence was in favour of the development of the pendentive dome from the Pantheon at Rome through numerous buildings to St. Sophia at Constantinople. He did not think that there was any proof that the Byzantines got any hints on the subject from the East; indeed, it was much more likely that the Eastern architects got their ideas from Byzantium. With regard to the stalactite vaulting, Mr. Bonomi, during the construction of the Alhambra Court at the Crystal Palace, had explained how it was made. It was very beautiful, but not very grand or dignified. There were fifty other points mooted in the paper which he should have liked to touch upon, had time permitted. The most interesting part of the paper was that which related to modern Persian houses. The whole subject was one worthy of further discussion.

Mr. J. D. Crace called attention to a photograph exhibited of a modern Persian house at Bagdad, occupied by the English Consul-General ten or twelve years ago, and said he desired to add his humble confirmation of Mr. Fergusson's view that it was hopeless to attempt to trace the direct sequence between ancient Persian art and the Saracenic which exists. He thought that the remains at Mashita in Moab formed an interesting link in the history of Eastern art, and he might mention that the Committee of the Palestine Exploration Fund were about to explore that side of Palestine which was east of the Jordan systematically. That part of the East was known to be covered to a much greater extent than Western Palestine with ancient remains, and he thought the projected exploration was likely to lead to valuable results.

Mr. William Simpson (of the *Illustrated London News*) said he had been much interested in the paper, though he had never been in Persia. The influence of Byzantine art was, he thought, plainly apparent in the sculpture found in the Jellalabad Valley, and that Byzantine influence may have travelled along the shores of the Mediterranean and through Persia. With regard to the perforated plaster panels or windows, the use of which had been stated to be the exclusion of the direct rays of the sun, they were much used in India, and he thought their principal use was rather to keep out animals while admitting air. With regard to pendentive domes, he believed that the finest specimen in India was that of an old mosque in Delhi called Kila Kona, or the old fort. He considered that mosque to be the finest in India, if not in the world, though it was not so tawdry as the Taj Mahal. The dome particularly was a beautiful specimen of work. It was not a bulbous dome, for bulbous domes only occurred in the later mosques.

Mr. Phené Spiers said his travels in the East had not extended so far as Persia, but he confessed that he was somewhat surprised to be told (as he understood the paper) that to Persia we owed not only decoration, but construction. He did not think the paper contained proofs of such an assertion. He thought the general impression of those who visited countries where Saracenic architecture was found was, that a great deal of influence was due to Persia in the matter of the decorative work. Our historical knowledge of the subject was entirely due to Mr. Fergusson, who had sufficiently proved that the origin of the pendentive, as seen in St. Sophia's, Constantinople, could be traced, example by example, from the Pantheon and other buildings at Rome and Ravenna. Moreover, the Count de Vogüé had shown in his book that in Central Syria were worked out and developed, in the third and fourth centuries, some of those problems which we saw in their later development in St. Sophia's.

Mr. George Aitchison said he quite agreed with Mr. Fergusson that it was a very great pity that so very large a span of history had been embraced by the paper. He had hoped that Professor Lewis would not have gone into remote periods of Persian history, but would have confined himself to the interesting materials which Mr. Clarke had collected. He should have thought that if the Moguls did introduce any colour into the world it was blood. If ever there was a rascal it was Timour or Tamerlane, who, when he took any large town, slaughtered men, women, and children, preserving only the lives of artists likely to be useful to him. The subject treated of in the paper was one of peculiar interest, for Mr. Purdon Clarke, during his residence in Persia, was able to procure the trade pattern-books of the masons and building artisans of Persia. The stalactite vaulting, which had been, if not the admiration, at any rate the astonishment, of the world, appeared to have been reduced to such a system that the workmen were able to execute it with the greatest facility and accuracy, affording an instance of tradition in art which no doubt existed in the Gothic period. He believed that some of this vaulting was executed in Paris in 1878, by Persian workmen in the building erected by order of the Shah at the Exposition.

Mr. Wild (of Sir John Soane's Museum) said he thought that M. de Vogüé's book on Central Syria showed clearly the transition from the Byzantine to the Saracenic or Arabic style. With regard to the construction of the stalactite vaulting, he should be pleased to explain it in detail on some future occasion.

The Chairman, in closing the discussion, said he was in hope that there would have been a fuller discussion on the subject, but Persia was still very much a *terra incognita*, and he agreed that it would have been better had the paper covered only a portion of the subject, leaving other portions to be dealt with in subsequent papers. He was very pleased to hear from Mr. Crace that the Committee of the Palestine Exploration Fund had determined to explore some of those singularly-interesting sites in Eastern Palestine which were upon the confines of Persia, for, from personal acquaintance, though but a cursory one, with some of those sites, he was convinced that some interesting discoveries would be made. That part of the world had been closed to investigation for so many centuries, that the work which the Palestine Exploration Fund proposed to do there was likely to prove a very great and important contribution to archæological science.

The next meeting of the Institute will be held on the 14th inst., when the discussion on Mr. Robins's paper on sanitation in architecture will be resumed.

PARSONAGES.*

IN a large proportion of the old Sussex livings is to be found either standing alone or built into and incorporated with the house, a timber-built cottage, with solid oak beams, a great central chimney-stack, lead-light casements, brick nogged or plastered panels, sometimes weather-tiled on the upper part, two stories in height at the front and one end, with a high-pitched roof running down to within a foot or two of the ground at the back and other end. The plan consists simply of three or four rooms on each floor leading out from one another. The lowness of the stories and the insufficient height of the doors render it necessary for a modern man to take heed to his ways as he walks about therein. Such were the humble abodes of the mass of the country clergy two hundred years ago or less. Since that time parsonages have passed through every form taken by other houses. It was discovered that the old timbers exceeded the necessary scantling in size: so fir was introduced of dimensions terribly attenuated. Slates were a great invention, and might be put at so much lower pitch than tiles, so on they went at an angle of thirty degrees or less, but the south-west wind drives the water right through. Then came the Gothic revival, when every room was gabled, and an accumulation of gutters and snow stores created marvellous to behold, and terrible to keep clear and in repair; while to suffer patiently all the evils arising from casements and small lights may almost be regarded as the special form of martyrdom, not so severe perhaps, but far more lasting than that now in vogue, by which the parsonage-building clergy of the day proved their orthodoxy. Common sense, double-hung sashes, and to some extent Queen Anne (not in this case the bountiful lady of Dean's-yard) have advanced us some stages farther, while the old weather-tiled timber-houses have asserted a very considerable artistic influence in all those parts of the country where brick and tile rather than stone and slate are the natural building materials.

Never before, I imagine, were architects so free from the tyranny of style and prejudice, and so able to satisfy, in accordance with the dictates of common sense, any definite requirements such as those issued by the Ecclesiastical Commissioners, to which I have now to call your attention in detail. It is, of course, quite possible you may not have to get the consent of the Commissioners to your drawings, but you will hardly neglect the particulars issued by them, even if it be only to coerce a possibly self-willed client into the right way. Mr. Christian told me, and has allowed me to repeat here to-night, that he is always ready to look over when in pencil any drawings which are to be submitted to him. This is a privilege I advise all young men to avail themselves of. The mention of young men reminds me that in this Association I am entitled to consider myself as speaking to our younger members, and if any who are older have done me the honour of being present to-night, they must excuse me if I appear to them but an utterer of platitudes. But to return to Mr. Christian. Show the points of the compass on your plan, and look after your aspects; for, until you have satisfied him that you have obtained all the sunshine and cheerfulness that the site is capable of affording, you will have a bad time of it. The Commissioners suggest the provision of two sitting-rooms, with the somewhat modest dimensions of 16 ft. by 14 ft. It is certainly desirable that one room, at least, should exceed these dimensions, and I am inclined to give preference to the dining-room, as being that best adapted for those meetings of parishioners or of neighbouring clergy which constantly occur in parsonages. The dining-room is,—as, in fact, the Commissioners call it,—a "sitting-room," in some cases the family sitting-room. It must be cheerful, with south-east or southern aspect, and as unlike as possible to the state dining-room looking north of a gentleman's mansion. The drawing-room, or ladies' room, has no special features in a parsonage. A bay will almost certainly be asked for, as some picturesqueness of plan is now much appreciated. It is well to provide a side wall where a conservatory may be placed, with a French casement opening in that direction. The study is a room of considerable importance. It should be free from the disturbing influences of the household; for instance, its fire-place should not be back to back with that of the kitchen; the constant raking of the kitchen fire constituting, I have been told, a considerable nuisance. It should be easily accessible for callers, though the kind of parish largely affects the mode in which this is to be provided for. In purely agricultural parishes, with the exception of the squire and a farmer or two, the people will all go to the back door and feel themselves much more happy to be shown in that way or to be seen there. In more populous places the front door will be more used, and a study accessible without passing much into the house is desirable, while in towns a special study entrance or exit is sometimes provided. A cheerful morning sun is desirable; the hot sun of an afternoon is conducive to sleep rather than to study. Above all, whether the parish is large and the incumbent an active business man, or whether he be of those who have comparatively light professional duties and on whom, consequently, rests the responsibility of maintaining that high standard of learning, theological and polite, which in these days of so many ologies it is difficult for business men to attain to, the study should be sacred. There papers should rest undisturbed, books should remain open at the page last scanned, and even dust should be treated with some respect. Such a room need not be large, and a small room offers less temptation for domestic incursions. I think the 14 ft. by 12 ft. given by the Commissioners is very ample. Of the kitchen and scullery I do not know that it is necessary to

* A paper by Mr. Lacy W. Ridge, Surveyor of Ecclesiastical Dilapidations in the Diocese of Chichester, read before the Architectural Association on the 21st ult. See p. 120, *ante*.

speak very particularly. To the five bed-rooms, each with a fire-place, I would certainly add, at least, one dressing-room, with a fire-place if it may be, and large enough to hold a bed. Where only one dressing-room is provided, it is not a bad arrangement to make it applicable to either of two rooms, so that if guests come who expect that accommodation it may be given over to them. It will be well to have definitely in mind which rooms you intend specially for the servants, and in some cases the adaptability of certain rooms for day and night nurseries will be discussed and provided for. I need scarcely say that five bedrooms are generally regarded by the clergy as a very small amount of accommodation. The Commissioners go on to ask for a pantry or china-closet, larder, water-closet, wine and beer cellar, coal-house, dustbin, &c. There should, if possible, certainly be a pantry rather than, or in addition to, a china-closet. Where there is a glebe meadow, so that cows are kept, a dairy is necessary, even in the smallest house. It should be near the back door. In remote places this is more important. One rector told me that unless he kept cows the cottagers could not get milk. Of water or earth closets I find three are generally required. One on the first floor or first landing; one for gentlemen's use, either external or on the ground-floor; and one in connexion with the servants' offices. As a rule the last two I provide as earth-closets wherever there is a garden. The provision of a cellar is much appreciated as serving as an additional store, it being remembered that tradesmen do not call daily for orders in the country, and that co-operative stores are a long way off. It is also useful as a summer larder; and may be used as a dairy. When there is a cellar a wine-cellar can easily be provided. In other cases a place must be found elsewhere. Mr. Christian suggests under the stairs, where some ingenious bins can be made. At the present day the wine-cellar in a parsonage is rapidly becoming a matter of comparatively small moment. Do not excavate a cellar in a damp soil, as a wet cellar is very dangerous to the health of a household. For the coal-place, cleaning-room, servants' E.C., I have found it a good plan to provide a separate door out of the scullery, with a little covered lobby or yard, so that the servants go to these offices by a private way without coming in contact with the numerous callers who come to the back-door of a country parsonage. In one plan I have, in fact, abolished the old scullery back-door and substituted a door calculated, I think, to be of very general use for tradesmen, servants, and parochial callers, as well as being a back-garden door. Where the front door opens into a portion of the garden, and there are casements in the drawing-room, I hardly consider a special garden-entrance necessary. It makes an additional external opening to bolt and bar, and is liable, unless very well managed, to be productive of through-draughts, with the consequent slamming of doors. One thing not mentioned by the Commissioners, which is almost essential, is a back staircase, or, at least, part of one. Where all the sitting-rooms are on the ground-floor it is sufficient to provide a back staircase to the level of the first landing only. To have a back staircase leading from the ground-floor to the attics and principal stairs to the first floor only, is, of course, the more luxurious arrangement, and is suited to houses somewhat beyond the Commissioners' minimum. An additional room very much valued is a parish room. This does not mean a small public hall such as that attached to the church of Whitechapel, or those which some London clergymen have provided, but a rough room suitable for night schools, choir-practices, and similar meetings to which the people will come in their working clothes, a place where mothers' meetings may be held, the parish lending library kept, soup distributed, blankets served out, and the hundred and one other things done of which a country parsonage is the centre. It serves for a waiting-room and for interviews with callers, especially those of the rougher classes. It should be easily accessible from the parish or back-door, rather than from the front door. In proportion as the village and parish gets smaller, the number of works of which the parsonage is the centre becomes greater. The clergyman and his family unite in themselves the offices performed in towns and larger places, by the district visitors, guilds, and other organisations, and the parsonage becomes the soup-kitchen, the penny-bank, and even the dispensary. With regard to many things which, with the greater facilities and higher wages of towns, the poor can well do for themselves, they have in the country to rely on the help of the parson, or other benevolent inhabitants. There are many nights when it is easy enough to go to a well-lighted school-room in a town, when to attempt a meeting in a badly-warmed and lighted detached school-room in the country would be very miserable. Hence the importance not only of having such a room as this, but of having it in the house. It may, of course, also serve on occasions as a school-room, a play-room, a servants' hall, a work-room, or other domestic purpose when not required for parochial work. It should have good means of ventilation. In the country, store-closets are very necessary. A linen-closet near a flue, if possible, or containing the tank of a hot-water system, is very desirable. An architect consults his own interest in providing that the sheets are quite well aired in his client's house. A good clothes cupboard in the servants' bed-room is very useful. A bath-room is very nice, though in these days of the morning cold-water tub (every man in his own room) not a necessity. Unless funds are very ample, so that all reasonable wants can be supplied, I think the bath and the hot-water system should be provided at the incumbent's personal expense, and remain his property to sell to his successor. Cold water, it will be expected, should be laid on to the first floor, and a housemaid's sink will be necessary.

Of course, you will not connect any sinks direct with the drains. Unless the well is shallow, so that pumping water up is easy, rain water should be collected from the roof, and a supply for the first floor provided. The overflow should go to a tank in the ground. There are cases in which you have to depend wholly on rain water, and then the stowage should be very ample to cover dry seasons. In such cases earth-closets have manifest advantages. The water for the kitchen boiler ought to be filtered. When you have a deep-well and force pump, its position is of great importance, and should be fixed before setting out the house.

The Commissioners go on to provide for proper construction of the buildings. For warmth, as well as for dryness, it is desirable to use hollow walls, properly bonded. My usual practice is to have 1 ft. 4 in. hollow brick walls on the ground-floor, and 9-in. brickwork, covered with weather tiling, on the first floor.

This has many advantages (beyond the appearance) over carrying the 1-ft. 4-in. walls up the whole height. You get a far better bearing for your plates, especially those of the first floor. There are no difficulties to contend with over the heads of windows, and there is no fear of sound being conducted up the hollow from one floor to another, a defect with which I have heard hollow walls charged. I have arrived at the following section of wall. Footings in the usual way; at the level of the underside of the plate of the ground-floor, put the damp-course on the inner face of the wall only, carrying the hollow 3 in. at least below it. It is best to have the 4½ in. thickness of brickwork on the outside, and the 9-in. inwards. At 9 in. below the first-floor plate build solid; the projection of weather-tiling will keep this dry. From the plate-level have 9-inch work, which, if the bricks are really square, may be built with bricks on edge, in Flemish bond, giving 4½-in. courses, into which the plain tiles can be nailed, with long galvanised nails, with heads. This work will certainly be dry. In suitable positions 11-in. hollow walls are now allowed. The Commissioners allow battening. I have seen so much of it old and dilapidated, and of about the strength of a band-box, that I have the strongest prejudice against it. For your peace of mind put a damp-course to your chimneys, at the junction of the stack and the roof, stepped up the rakes. Do not lay tiling in the London way. It is not at all understood here. Lead flashings on tiles, dressed down as on slating, are useless in the country. The other requirements of the Commissioners are of a practical kind, calling for little special remark. The table of joists is calculated to give a most satisfactory feeling as one walks over the floors. If it is in excess it is an error on the right side. I hardly know why the interior of the roof-coverings are to be pointed. It is not insisted on. Access to roofs and gutters is desirable, not only for general purposes, but because parsonages are subject to surveys at not infrequent intervals, which, from the nature of an incumbent's liability as to repairs, ought to be as thorough as possible. Do not, however, have more central gutters than you can possibly help. No one ever goes out paddling about on a roof without doing more or less harm. My own practice is, as much as possible to cover houses with a single roof (broken up and disguised, it may be, with dormers, gables, and hips), starting from a high level on one side, and running down on the other generally towards the north, to a few feet from the ground, developing the principle of those old cottage parsonages of which we have spoken. The snow takes itself off, and the roof can be seen from the ground. How many thousands have suffered,—I speak feelingly,—in the last few days, from the pure stupidity of our ancestors, who preferred any quantity of parapet and central gutter to showing their roofs.

The requirements of the governors of Queen Anne's Bounty correspond with those of the Commissioners. No paper on parsonages would be complete that did not treat the subject of alterations. The Bounty requires in such cases an estimate of the value of the old materials which you will have to furnish. Speaking generally, bricks and stones will be, to some extent, re-usable; old tiles, when old and sound, are better than new; a few doors may be available; sashes and frames are seldom worth putting in again; old oak is very disappointing. The men object to working it on account of its extreme hardness, and the nails in it. You will, of course, see carefully if there is any lead. For the rest the old materials will hardly pay for taking down.

With a few words on alterations I will finish.

An incumbent comes to a benefice and wants the house made habitable and convenient, according to ideas of refinements of the day. From a critical point of view the old place is probably chaotic. The question is constantly asked by the neighbours,—Why did you not take down that old place and build a new house? The reply is, that for a given outlay you can get a much larger house with more accommodation by retaining as much as possible of the old place, than by the highly popular process, with those who have not to find the money, of clearing away and building *de novo*. I must confess, moreover, that an old place intelligently altered is to me more charming than a bran-new house. It has so many more picturesque accidents about it, while the varieties of the houses produced by remodelling are endless. You lay the plans of the old house down on paper, and then without any undue prejudice, arising from the uses to which the different parts are now put, con over how best you can bring the place into accord with modern ideas. I will mention two instances. No. 1 was a house built on the intelligent principle of putting the front door in the middle and a sitting-room on each side. There was an extremely fine view looking south, so the house fronted that way; but, unfortunately, the road came up north-west, and could by no possibility come any other way. The relationship between the carriage-drive and front door was, therefore, curious. The rooms were very small, and not sufficient in number for the new incumbent. It was much dilapidated. We turned the place about as shown on the new plan Even the one uncurable defect of insufficient height we struggled with, by lowering the dining-room floor. Of course, the place is not without considerable defects as compared with an ideal; but the alteration has been much commended by those who knew the old house. Another instance was of a square-built house of the beginning of the century, of compact plan far more difficult to treat than the older place. The incumbent wanted a good library and bedrooms for pupils, while the lady was to be indulged with a bay. The study, which was close to the door, became the parish room, and the library was built. The wonderful feature of the house was its roof. It was built as a cottage *orné*, with a thatched roof showing round the outside; but, either that no chimneys should show or because they feared fire, the flues were carried along horizontally over the level of the first-floor ceilings, and carried up in the middle of the roof away from the thatch. So extraordinary a collection of gutters, walls, and flues was, I should think, nowhere else to be seen. This was the architect's opportunity: we raised the walls, put on an entirely new roof with gables and a dormer, each containing two small windows, and intended to be divided (at the incumbent's own expense, of course) into two cubicles for the pupils aforesaid.

MR. CHRISTIAN ON PARSONAGES.

MR. EWAN CHRISTIAN, Architect to the Ecclesiastical Commissioners, after the reading of the foregoing paper, said he should have liked to hear some of the other members of the Association on the subject,—Mr. Paice, for instance, who had built a capital parsonage in Wales, or Mr. Blashill, who knew all about parsonage-houses. Mr. Ridge, in his paper, had said very much in almost the same words as he (Mr. Christian) would have used, and had treated the subject very ably and properly, although there were some points which he had rather missed or not duly emphasised. A parsonage-house, as Mr. Ridge had said, was like any other gentleman's house in some respects, although it was unlike in other matters. For a parsonage the architect had to build for a very small sum a good house for a gentleman to live in. Very frequently the occupying clergyman would be a man who was a member of a good family, who had had ample means in his youth, and who had been accustomed to live in large houses, and who might find it, therefore, somewhat of a hardship to have to live in such small rooms as those which were compatible with parsonage-building, although he was bound to say that he had often found men of this class the most easy to provide for and accommodate, they being frequently less exacting in their demands than some of those who had not been nurtured in luxury. In considering the accommodation to be provided in a parsonage-house, the architect would be brought face to face with the difficulty that, while the clergyman for whom it was built might have considerable private means in addition to his living, and so might be able to maintain with ease a rather large house, he might, at no remote period, be succeeded by a man who had no means whatever beyond his clerical income, and to whom a large house would be a very great burden, especially when there was a large family to maintain. Mr. Christian went on to say that he would, for the benefit of the younger members of the profession, speak of the mental process which he underwent when engaged in looking over plans of parsonage-houses submitted to him officially for examination. First of all, with regard to site, he expected to have a plan with the points of the compass marked on it so as readily to see what would be the aspect of the building. In this matter he was, of course, speaking solely with regard to parsonages in the country, where there was generally a choice of aspect. In this connexion architects should never forget that if a house was to be a healthy habitation, it must be so situate as to get all the sunlight possible. He had found so much difficulty sometimes in persuading parsons, and even architects, of the necessity of sunlight that he had had inscribed in his office an Italian proverb which he fortunately heard quoted while attending one of Professor Cockerell's lectures. The proverb in question was, "*Ove non viene il sole, viene il medico*," which, translated, was,—"Where the sun does not come, the physician must." That proverb had stuck to him ever since, and he was a thorough believer in it. Two of the first persons who saw the motto stuck up in his office were architects,—one of them very well known to the Association, viz., the late Mr. Edmund Sharpe, who, curiously enough, wanted Mr. Christian to build him a parsonage, but told him that in the proposed building it would be impossible to carry out his views as to sunlight, there being nothing to the south of the site but the church, which had been erected from Mr. Sharpe's own designs. He (Mr. Christian) did not believe in the impossibility of getting the sun into the proposed building, whatever there might be to the south of it, and he subsequently found that he was quite correct in his anticipations. He quoted the particular case of a house in Warwickshire, where the only view to the south was into the back slums of a manufacturing village, there being a very beautiful view to the north. Even in that case he found it practicable to get the sun into the rooms of the house without adopting the disagreeable outlook. Therefore, he did not believe in difficulties,—he never had, and never should. When, in looking over plans submitted to him, he objected that the sunny aspects of the site had been overlooked, he was often answered either by the parson or the architect, or both, that it would be impossible in their particular case to get the sun into the house, because there was a mountain, or something else which would prevent the rays of the sun from shining into the building. Three times in the course of a great number of years he had given way under such representations, but in each case, when he had afterwards seen the buildings, he had found that he had been quite wrong in yielding, because with the slightest ingenuity on the part of the architect, and but for the obstinacy of the parson, the sun could have been let into the house. Therefore sunnyness of aspect was the first point to engage his attention. Then came another point frequently overlooked, not by Mr. Ridge, but by some men who had essayed the planning of parsonages. In parsonage-houses where there were small incomes, the economies of the house should be considered. He was sometimes persecuted by seeing rooms which would not be, perhaps, much larger than demanded by the requirements of the Ecclesiastical Commissioners, say 16 ft. or 18 ft. by 14 ft., having nearly the whole of their wall space filled with windows, there being sometimes as many as five windows provided to one room. When it was considered what that meant it would be seen to be a thing of greater moment than would at first sight appear. Every one of those windows required to be furnished with curtains and blinds, and with shutters which would in most instances have to be closed every night. All this involved not only first outlay, but a continual amount of servants' labour, and the cost of servants' labour was a very important point in a parsonage-house. In parsonage after parsonage which he had visited throughout the length and breadth of the land, he had found only a single servant. In fewer instances he had found two, and in rare instances three; but in a very large number of parsonages only one servant was kept, and how was it to be expected that one servant could keep clean and tidy a house in which everything was overdone and so devised as to involve constant labour and attention? When, therefore, engaged in planning a house of any kind, but especially a parsonage-house, the architect should look to the economies not only of furnishing, but of servants' labour. Wherever there were needlessly long passages, caused by want of proper planning of the various portions of the house in relation to each other, there was involved an amount of servants' labour which was sheer waste. Then there had to be borne in mind other economies, such as economy of heating and fuel. A great many of his friends,—and especially his young friends,—were very fond of the æsthetics of building, and they liked to put their chimneys on the outside. He (Mr. Christian) liked to see chimneys on the outside when built after the old fashion, with good massive bases to them, 5 ft. or 6 ft. thick, such as were to be seen in some of the old manor-houses. Such chimneys as those would retain the heat inside the building, and not allow it to vanish into the outer air, as would some of the wretched and starved outside chimneys now too often seen in modern buildings. Outside chimneys, if properly constructed, possessed the advantage of readily admitting of a supply of fresh air, but it should be remembered that the parson, as a rule, had not much money to spend on coals, and therefore it was of great importance that his house should be warmed at the least possible cost, which could certainly be better done by having the chimneys inside the building wherever possible, instead of in the outside walls. It was also necessary that the staircase and the hall should have plenty of fresh warm air, for unless that were the case the house would never be thoroughly wholesome or comfortable; nor should windows for lighting and ventilation of the staircase be forgotten. He often had submitted to him plans in which the staircase was right in the middle of the house, and without any means of ventilation. That was a very bad arrangement, for the hall and staircase, properly treated, were really the lungs of a house. He held with Lord Bacon that "Houses are built to live in, not to look on." Where the architect had to deal with a parson who was obstinate, and insisted on having work done that ought not to be done, he should not give in to him. As to matters of construction, Mr. Ridge had spoken of hollow walls, and had recommended a thickness of 9 in. inside and 4½ in. outside, in which he (Mr. Christian) entirely agreed as a matter of construction, because all the bearings of the floors naturally come upon the internal wall; but with this arrangement there was the difficulty—and it was a great difficulty—that with a hollow wall 4½ in. outside, and 9 in. inside, the inner and outer portions could not be properly bonded unless with very expensive bricks, such as Jennings's or other bonders, which would bring the cost up to more than that of an 18-in. solid wall. It would be absurd to think of bonding such hollow walls with iron ties, because if a hollow wall were to be bonded well and soundly with iron it was necessary to use a good substance of iron; for if the water came through the external 4½ in. of brickwork,—which it would unless the brick was very good,—the small iron ties would speedily rust to decay, and then away would go the whole of the wall. Therefore, though theoretically the 9 in. was better on the inside, and the 4½ in. on the outside, he thought that, all things considered, it was better to put the 9 in. of wall on the outside, and the 4½ in. inside. The bond usually used in hollow walls was, he thought, generally insufficient. The best kind of hollow wall, where funds permitted, was to have two thicknesses of 9 in. wall, bonded with hard, hollow brick, with a cavity of 3 in. Hollow walls were a great aid to warmth, comfort, and dryness, because, in point of fact, they interposed a blanket of air between the air of the room and that outside the building, and so equalised the temperature, making the cold in winter and the heat in summer less felt than was the case with solid walls. Many years ago he had to make an addition to a house near Wolverhampton; it was a very good house, built with a 14-in. wall. It was a house of some interest, inasmuch as it was the birthplace of Huskisson, the statesman, who was killed on the day that the Liverpool and Manchester Railway was opened. Well, in building the adddition to the house, which cost about 6,000*l*., he (Mr. Christian) built all his walls hollow, on the principle of which he had spoken, viz.,—two 9-in. walls with a cavity between them, and the old solid 14-in. walls he cased with a solid 9-in. of new work. In the month of November, after the work was executed, there came one of those sudden changes to very warm weather from very cold, and a morning or two after this change of temperature he had letters from all parts of England from people who complained of the dampness of their walls internally because they had not the wit to see that it was the result of condensation. He was anxious to know what was the state of things in the house he had mentioned, and was informed that the whole of the walls (hollow) in the new portion of the house were perfectly dry, although the walls of the old part of the house (solid, 21 in. thick) were running down with water, as badly as any of the walls of neighbouring houses. Mr. Ridge had very properly said that parsonage-houses were not the buildings for the display of fancies; but he (the speaker) constantly had plans sent to him showing flimsily-constructed carved barge-boards, perhaps in pitch-pine or deal, without any proper provision for durability. He also very strongly objected to such things, for parsonage-houses must not be built of materials that would rapidly decay or require constant painting. Mr. Ridge had not said anything about drainage or soils, although he had very properly spoken of the value of earth-closets under certain circumstances. With regard to window-glazing, Mr. Christian strongly condemned what he called the "architectural fad" of filling the upper portions of window lights with ridiculous little squares of obscure glass, shutting out the light of heaven. That was a serious mistake, and was now being copied by the speculating builders, as any one could see who walked along that wonderful "Fitzjohn's-avenue," at Hampstead. It was absurd to shut out the light of heaven, and the practice could not be too strongly denounced; for it was oftentimes a great relief for people to be able to see the ever-changing and beautiful sky as they sat in their rooms, while the inability to do so had a most depressing effect. It was, he believed, a well-authenticated fact that in a "model" prison, conducted on the "silent system," many of the prisoners went mad, and after architects, surveyors, and medical men had been called in, unavailingly to explain the cause, a lady who was in the habit of visiting prisons was asked to see if she could detect the cause. She noticed that all the windows were glazed with obscured glass, and recommended that it be taken out and replaced by clear glass. It was done, and from that time the lunacy ceased. It should not be forgotten by the architect who was engaged on a parsonage to provide plenty of cupboards, shelves, &c., even though at the cost of sacrificing some little piece of "prettiness," for, again to repeat Lord Bacon's maxim, a house should be built to live in,—not to look on. The Ecclesiastical Commissioners allowed

battening to be used, but he (the speaker) did not recommend its adoption. In conclusion, Mr. Christian strongly deprecated the use of old oak from roofs or elsewhere for floor-joists, particularly on the ground-floor, for it was sure to rot in a very short time. That was his experience, verified and confirmed over and over again.

Mr. Thomas Blashill moved, and Mr. Hampden W. Pratt seconded, a vote of thanks to Mr. Ridge for his paper; and that gentleman having replied, the meeting terminated.

PUBLIC WORKS AT ATHENS IN THE AGE OF PERICLES.

THEMISTOCLES, CIMON, AND PERICLES AS ÆDILES.

This was the subject of Professor C. T. Newton's second lecture of the present term delivered on the 21st ult. He commenced by referring to the capture of Athens by the Persians, B.C. 480, when the temples on the Acropolis were burnt. Soon afterwards, as the historian nearest to the time (Herodotus) told us, curious omens were reported as having been witnessed on the Acropolis by certain Greeks who were with Xerxes, and who had permission to visit it. There was on the Acropolis prior to the advent of the Persians a sacred olive-tree, believed by the Athenians to be the parent of all the olive-trees of Attica, and supposed to be under the patronage and protection of the tutelary deity of the city, Athene. Although the olive-tree had been cut down by the Persians only two days before the Greeks in question visited the Acropolis, the visitors declared that its stem had put forth in the short interval that had elapsed a shoot 1 ft. long. That was regarded by the Greeks as an augury of good things. The battle of Salamis turned the tide in favour of the Greeks, and from that event dated the creation of a new Athens under the administration of three men who were eminent not only as statesmen and generals, but as builders, viz., Themistocles, the victor of Salamis; Cimon, the hero of the naval battle of Eurymedon; and, lastly, Pericles. The successive administrations of these three men extended over the period of fifty years which intervened between the taking of Athens by the Persians, and the beginning of the Peloponnesian War, B.C. 431. Immediately after the battle of Salamis and the retreat of Xerxes, the question arose how Athens could in future be defended from the assaults of enemies, and Themistocles said, "We must fortify the city," and, notwithstanding the jealousy and opposition of the Spartans and other peoples of the Peloponnese, he succeeded in making a wall of circumvallation round Athens which, we were told, was seven miles in length. He is also believed to have built the north wall of the Acropolis. He then turned his attention to the Piræus, which nature intended to be a great harbour and arsenal, and Themistocles, as a general, was not slow to perceive the advantages of its position. He at once began to fortify the Piræus and Munychia, and to connect them with Athens, and round the port of the Piræus he carried a wall built in the most magnificent and solid manner with large squared stones, 14 ft. or 15 ft. thick. These squared stones were used throughout the wall, instead of there being, as was often the case in Greek cities, two outer casings of ashlar filled in between with rubble work. The enormous solid blocks used in this wall were properly bonded, and the construction was further strengthened by the use of metal cramps. This work, which ensured the safety of the Piræus, was the great achievement of Themistocles. He was believed also to have had in view the connecting of Athens itself with the Piræus by those long walls afterwards so celebrated in Athenian history, and which, in fact, converted the two cities of the Piræus and Athens into one. The career of Themistocles was cut short about 460 B.C., by his banishment, upon which Cimon succeeded to power. His term of administration was short; however, he built the southern wall of the Acropolis, and the great bronze statue of Athene Promachos, within the Acropolis, was probably dedicated in his time in celebration of the victory of Marathon. Cimon was the personal friend of the great painter of the day, Polygnotus, and it might, therefore, be assumed that it was in Cimon's time that Polygnotus painted the portico in Athens called the Stoa Poikile, and decorated the building on the Acropolis which Pausanias describes as "the building containing the pictures," and also the Temple of the Dioscuri. It was also in the time of Cimon that the celebrated painters Micon and Panenus are known to have executed paintings in certain public buildings, taking as their subjects scenes out of the "Iliad" and "Odys-ey," and incidents of the Trojan War, and of the Battle of Marathon, in which portraits of the great generals who took part in the wars, such as Miltiades, were introduced. We could not point to any other work with which the name of Cimon was connected unless we admitted the theory, often urged, and as often disputed, that he built the little Temple of Victory at the entrance to the Acropolis. That theory the lecturer thought must now be abandoned, the balance of authority being against it. Pericles, who succeeded to power on the banishment of Cimon, soon came into notice as an extensive builder; for he built the long walls which connected Athens with the Piræus, between the years 458 and 451 B.C. This was a work of the most magnificent description, thoroughly well put together. From the evidence afforded by an inscription, it appeared that these walls were extensively repaired about the time of Lycurgus. This was the great exploit of Pericles, the uniting Athens and the Piræus into one city. He did more: he employed a celebrated architect, named Hippodamus of Miletus, to build a new city around the harbour of the Piræus, on a regular plan. This was the first city of which we had any record in which the streets were built at right angles, and with width enough for health and convenience. Hippodamus afterwards built Rhodes, and is no doubt the architect to whom allusion is made in the well-known passage of Aristotle, where, in the ideal city that is being built in the clouds, the architect is described as measuring everything out mathematically with his compasses. The Piræus having been divided by Pericles into a war harbour and a commercial harbour, he took great care to provide proper commercial buildings, such as a custom-house and buildings for the storage of grain. The period was now approaching when the Athenians, after having made many wars with their neighbours, with varying success, and after having reduced many of the most recalcitrant of their foreign dependencies, finally established their empire on a very strong basis. They contrived to transfer the treasure which was contributed for the defence of the Greeks against Persia, from Delos to the Acropolis at Athens, and about 455 B.C., they concluded a thirty years' peace with Sparta. In the fourteen years which intervened between the conclusion of this peace and the breaking out of the Peloponnesian War, Pericles made good use of his time. Having fortified Athens, and made it secure by sea and by land, he set to work to embellish it, and then it was that he built those noble edifices on the Acropolis of which we still had the remains. Then it was that he built the Parthenon, and placed in it the treasure which had been brought from Delos; he also built the Propylæa of the Acropolis, together with the magnificent Temple of Eleusis and the Odeum, a musical theatre, and dedicated the chryselephantine statue by Phidias of Athene Polias. Remarking that the Acropolis of Athens was still, as compared with other citadels of Greece, the most rare and interesting shrine of Greek art, the lecturer proceeded to exhibit plans of the Acropolis and of the buildings on it and in its immediate vicinity, among them views of the remains of the buildings as they exist, and restorations of them suggested by Professor Cockerell. The Parthenon was built by Ictinus, a celebrated architect, who wrote a treatise on proportion, and who also built the great Temple of Eleusis, which was also a work of the Periclean age, and was regarded by the ancients as a miracle of architectural beauty. It was quite unknown to us, but the Greek Government was in treaty for the purchase of the village which is supposed to mark its site, for the purpose of exploring it. The Propylæa was examined by the Dilettanti Society in the last century, and illustrated in their book on Attic antiquities. It had also been measured and very carefully examined by Mr. Penrose, in whose beautiful and very well known work on the architecture of the Parthenon would be found some interesting delineations and measurements of the ornaments and details. The Propylæa seemed to have been remarkable for the length of the beams of its roof. Pausanias described the Acropolis, and said that on the left there was a small building containing pictures, or the Pinacothek. Then he said that on the right-hand side was the Temple of Nike Apteros, or wingless Victory, which was another name for Athene herself. Having described the Erechtheium and other buildings on the Acropolis, the lecturer went on to say that the cost of the public works of the time of Pericles could not be exactly ascertained. The Propylæa cost, according to Heliodorus, 2,012 talents, a sum reckoned as equivalent to 460,000*l*. Leake, in his very valuable book, was of opinion that in this amount must have been included most of the outlay on the Odeum, Parthenon, Eleusinium, Propylæa, and Erechtheium, and calculated the whole expenditure on account of all these buildings at 2,950 talents. The whole amount was calculated by Grote at 690,000*l*. This did not include the walls already mentioned. The liberal expenditure on public works, dramatic entertainments and festivals, which distinguished the age of Pericles, had its source in the main in the wealth which flowed to Athens in the form of contributions, direct or indirect, from her dependencies. A point very noteworthy was the rapidity with which the fine buildings of the Acropolis were executed. The Parthenon was finished in 438 B.C., having been in hand, probably, since 445 B.C. The Propylæa was built between 437 B.C. and the beginning of the Peloponnesian war, 431 B.C. A brilliant account of the manner in which these great works were carried out was given in "Plutarch's Lives," where he says,—"These works, made quickly to last long, are finished with a perfection which leaves nothing to be desired." Writing as he did 600 years after the time of Pericles, he adds, "They are as fresh now as if made yesterday. They have all the charm of youth."

THE LATE MR. B. J. TALBERT.

In announcing the death of Mr. B. J. Talbert, which melancholy event took place at his residence, Euston-square, on Friday last, our readers will realise with us that we have lost one of our best decorative designers, and many of them will feel that they have lost a kind and genial friend.

Mr. Talbert, whose decease has taken place at the early age of forty-three, has made a name as a designer of furniture. Mr. Talbert commenced his working life with a wood-carver in Dundee, and afterwards in an architect's office in that town. From Dundee he went to the office of Mr. W. N. Tait, in Glasgow, and then to Mr. Campbell Douglas. Mr. Talbert was conspicuous in Glasgow for his talent as a draughtsman, and he here made the acquaintance (an acquaintance which ripened into a happy friendship when they met some years afterwards in London) of some other young architects and artists, who, like Mr. Talbert, have obtained a position in the art world. After a few years spent in Coventry, as designer to the art-metal firm of Skidmore & Co., Mr. Talbert came to London, and settled down to the class of work by which he has made his name well known. The Gothic school had no more enthusiastic and earnest worker than Mr. Talbert, and the publication, in 1867, of his first work, "Gothic Forms applied to Furniture and Decorations for Domestic Purposes," brought him to the front. The name of Talbert will be long remembered in connexion with designs in furniture and domestic decoration. As a draughtsman, Mr. Talbert had few equals, and in this, as well as in his designs, he had a style of his own. "Simple and true," were his own words, in "Gothic Forms," as to what design should be, a maxim which he has thoroughly carried out in all his works.

Such as his work, such was the man, "simple and true," manly, kind, and genial, always ready to do a good turn for some struggling artist; and witha! having a keen sense of humour, fond of a joke, and quick to see the ridiculous, and make fun of it.

Mr. Talbert was fond of exercise, and it may interest some of our younger readers to know that, when engaged on his first book, "Gothic Forms," the morning was not unusually occupied by a pull up the river as far as Richmond and back, and the afternoon and evening to his art work. Happy would it be if one could keep to this, but unfortunately as time goes art-work becomes too absorbing and too exacting, and the healthy exercise is abandoned.

As an architect, Mr. Talbert, unfortunately, never had the opportunity to show his strength further than on paper; but those who have seen his design for the Manchester Town-hall will appreciate the loss which has been sustained in his death.

BOOKBINDING, ANCIENT AND MODERN.

BOOKBINDING, in the sumptuous style which renders many old books more valuable for the art on their exteriors than for the learning within, may be considered to be if not a lost, at least practically a disused art. In the times when books were in every sense *objets de luxe*, when they were the production of long labour on the part of copyists, or were the comparatively few and costly examples of the new process of printing, there was reason enough that possessions so rare and precious should be bound accordingly; that they should be cased in solid covers for preservation, and decorated with a care and expenditure suitable to their value. But now that books are produced by many thousands annually, in so much that it is almost a distinction, in one sense, among people of education, *not* to have written a book, we must look in vain for anything like the care and cost once bestowed on the outside cover of a book, save in exceptional cases. Here and there may be found wealthy collectors of libraries who look more to show than substance, and who may take rank with the noble lord, in whose worm-eaten Shakspeare Burns indited his caustic lines:—

> "Through and through the inspired leaves,
> Ye maggots, make your windings,
> But, oh! respect his lordship's taste,
> And spare his golden bindings."

Occasionally a presentation copy of a Bible or some other book, or a show annual intended as a Christmas gift, got up regardless of expense, gives opportunity for the display of sumptuous binding. But in general, books are nowadays too common objects, of too little value or too easily replaced, to be considered worth the expenditure of money and elaborate design on their exteriors. Even solid and durable binding, without art, would mostly be thrown away on this thankless generation. In the days of our grandfathers, or even of our fathers, books cost more than they now do, and were bound so as to last; with a very Quaker plainness, indeed, but still so solidly that many volumes of that date have outlasted a dozen of the possible or probable lives of the books of the present day. Now there are such multitudes of books intended only for the moment, and so many editions are forthcoming of those which are of more lasting interest, that it would seem a mere throwing away of money to encase them in covers calculated to last longer than the intended life of the volume. Like the modern bricks, which Carlyle said were made for the short leases, the modern book-cover is adapted for the short life of the volume, which runs the gauntlet of the season in a circulating library, and then becomes, like Percy, "food for worms," or goes to make fresh paper for other equally perishable volumes.

The artistic element in bookbinding has, therefore, become matter chiefly of archæological and artistic interest, and this is the chief interest of the volume* the title of which is placed at the head of these remarks. We presume it must be in that sense that Mr. Cundall says that since the time when he read his paper on Bookbinding at the Society of Arts, thirty-three years ago, "bookbinding has assumed an importance equal to that which it enjoyed in the sixteenth century." It has assumed that importance as a subject of interest and study, but not surely in regard to its practical productions. If that be the author's meaning, we can only say that we see little ground for the statement. A certain small proportion of modern books exhibit some fancy and artistic feeling in the binding; but a large proportion even of these consist of conscious imitations of this or that form of antique binding. The modern bindings which, like those antique productions, really represent the taste and feeling of their own day, for the most part merit only the epithets "neat" or "pretty," not even with the addition of the quality of durability.

Some years ago, in relation to the interesting exhibition of specimens of book-binding at Kensington in 1874, we drew attention to some of the characteristics of the various periods of bookbinding illustrated there (see *Builder* for July 11th, 1874). The author of the present work says that he also profited much in his study of the subject by that exhibition. His volume, with its numerous and admirably-executed typical illustrations, gives an outline of the characteristics of book-binding at different periods, as well as can be done in a moderate-sized volume, an outline which would be filled up by the study of such an exhibition as that we have just alluded to, and which those who are seriously interested in the subject can fill up to some extent by researches in libraries and museums, researches for which Mr. Cundall's book gives many useful hints.

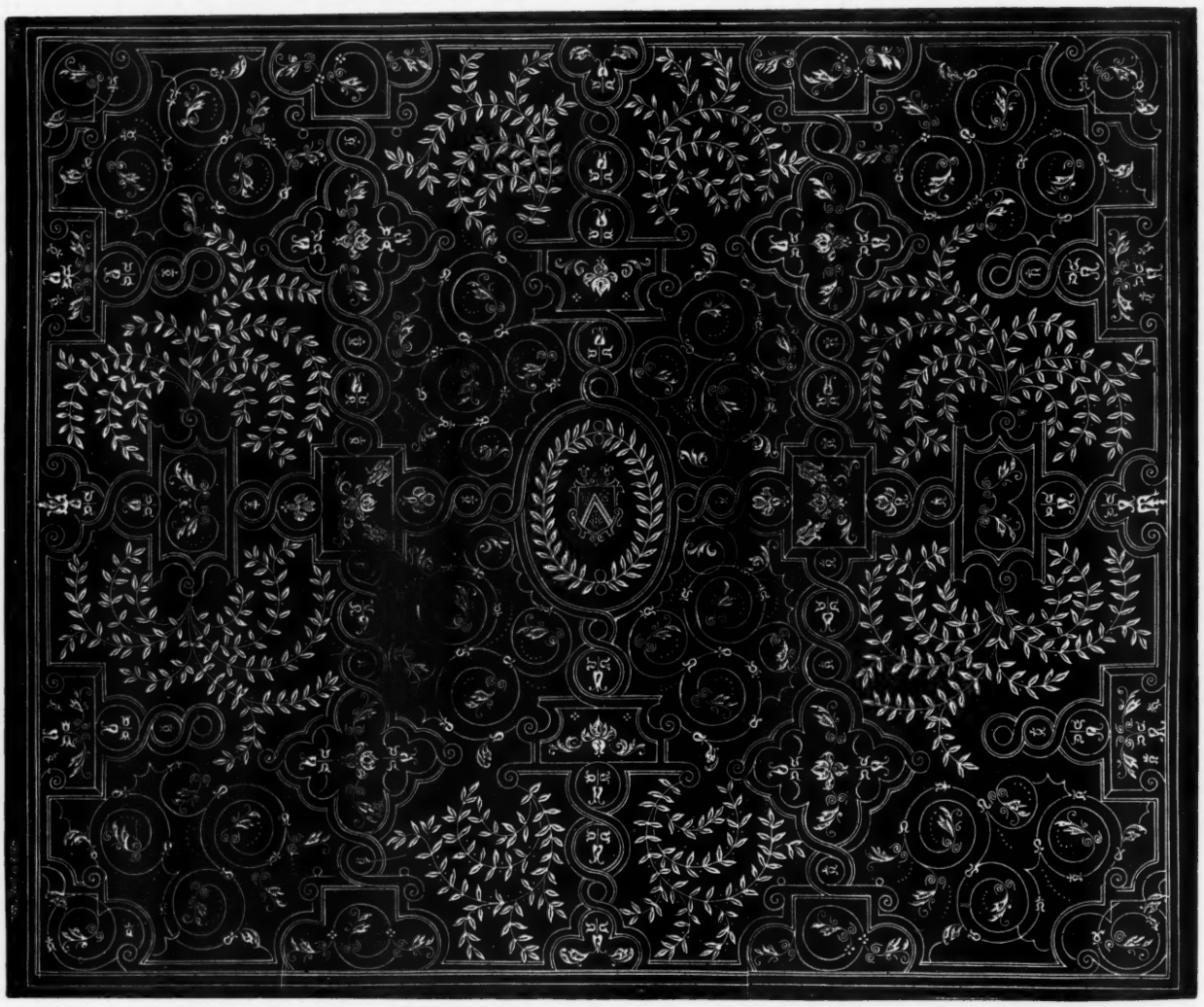
The whole progress of bookbinding, as far as the best specimens of each age are known to us, may be said to be in the main a progress from richness and elaboration to gradually increasing simplicity and handiness. In this respect, the art only follows the course of other arts as applied to objects which are also for use. Weapons of offence, for instance, such as swords and firearms, are less and less ornamented in proportion as we approach the modern period, and in place of the old richly-mounted pistols, and the blunderbusses with damascened or inlaid butts, we have the serviceable and finished neatness of the Colt revolver. It is a characteristic of the modern spirit for the most part to regard objects for practical use as best ornamented by the beauty of fitness and sound workmanship. And in regard to ancient bindings, just as there is greater richness in the binding of the earlier printed books than is usual in the present day, so there is still greater richness and elaboration in the binding of manuscripts than was generally indulged in after the invention of printing. In the manuscript days a book might be, as our author notes, the sole treasure of the kind in a great house; a bulky mass of inscribed and illuminated vellum leaves, too heavy to be easily lifted, and chained to a permanent desk or stand, for use by occasional (probably very rare) readers. The foundation of the binding in such a case was solid wood, and the precious possession and heirloom was not unfrequently ornamented, not only by jewelry and goldsmith's work, but by the insertion of bas-reliefs, or other work representing the highest art of the period. Mr. Cundall gives an illustration of one cover in carved ivory (ninth century) from the South Kensington Museum, with a Madonna and two other figures in niches, as well as subsidiary subjects. Others still more elaborate are mentioned; one in the British Museum, of the eighth or ninth century, is mentioned, of which the covering plates are of silver, "the centre contains the figure of a saint in high relief, one hand raised, the other holding a book. The book in the saint's hand, which has clasps, is ornamented with a geometrical pattern over the whole of its surface. The raised border of the covers is very massive, and is also composed of silver plates, in which large uncut crystals and precious gems are set, and which stand out very prominently. The corners of this valuable book have square medallions of gold with black enamels, representing emblems of the four evangelists." "On some especially valued writings, as on a book of Prayers belonging to Philip the Bold, Duke of Burgundy, pearls, gold nails, and rubies, were lavishly sown; and there is an account of a copy of Boccaccio, which was covered with red velvet, and on each cover five large rubies." This costly binding rendered necessary often a second cover of silk or some other material, to preserve the treasures of the binding. The goldsmiths appear to have had almost a monopoly of bookbinding during this Mediæval period of rich decoration.

The substitution of pasteboard for the heavier wooden covers had been inaugurated before the printed books came in; it must, at all events, have been adopted soon after, for the increasing practical use of books for purposes of study would have necessitated the introduction of a lighter and less cumbersome method of binding. The change in the aspect of bindings, their artistic style, is remarkable, though no doubt it took place gradually enough, if we could have all the steps in the change of fashion before us. Leather coverings with stamped patterns were now the prevalent form of binding; the stamping done at first in "blind-tooling," without gilding,—a style of ornamental work which, as we noticed in reference to the bookbinding exhibition of 1874, is by no means rashly to be despised by comparison with the subsequent gilded tooling; it has an effect of its own, and a certain sombre dignity which seems fitted for weighty books. Mr. Cundall derives the style of the impressed leather bindings from the East, of which there is every probability. The world-renowned Aldine Press was at Venice, and that city was the chief point of connexion between Italy and the East. The style of interlaced strap ornament, which became very prevalent, and which has been more or less imitated at intervals ever since, shows manifest traces of Saracenic origin, or even, in some instances, of direct reproduction of Saracenic design,—probably by artisans attracted from the East to Venice. With this Saracenic character of strap ornament became incorporated the style of foliated ornament peculiar to the Renaissance period in Italy; the symmetrically-twined ornament with thin stems and very artificial leaves, which is so graceful and elegant, although rather limited in its treatment and effect. One of the first illustrations given by the author of binding after the invention of printing, a copy of Procopius (Plate V.), shows the combination of these two types of design, the artificial interlaced strap ornament and the almost equally artificial foliage ornament twining through it: though in this case the strap ornament has in some degree lost its Arabic character. For a long time afterwards the range of bookbinding design is nearly confined to these main elements, the strap pattern and the artificial foliage, though there is an immense variety of detail in the treatment and combination of the two elements. But however elegant, refined, and suitable to its purpose is this style of Renaissance bookbinding, we should doubt whether it would be correct to base upon it the opinion mentioned by the author, that "at that time the greatest painters thought it no degradation to design a book-cover." It is, no doubt, quite true that such would be the feeling; artists in that day thought that everything might be equally dignified by art. But we should not ourselves trace the hand of the great painters of the Renaissance in book designs of the style here referred to and considerably illustrated in Mr. Cundall's pages. Elegant and suitable as the book designs of the period are, there is not much of fancy or individuality about them: a great artist designing book-covers would, we should expect, have evolved something beyond these. Holbein designed book-covers which are known, but these are superior in effect and originality to the ordinary run even of good specimens, and so we fancy it must have been when Raffaelle and Leonardo designed a book-cover, as we have no doubt they occasionally did. The various Italian bindings given as illustrations seem all, as we turn them over, to be varied repetitions of the same idea; strap-forms interlaced in curves or in lozenges, the forms of interlacing changing, but the idea remaining much the same. Some of the German specimens of a somewhat similar class of design are superior to any that are given of the Italian examples. For example, Plate XVI., the binding of a MS. of the sixteenth century, now in the Imperial Library at Vienna: this is a specimen of really ingenious combination and interlacing of lines, accompanied with very refined detail; and this class of ornament, part of the interest of which lies in ingenuity of device, is to some extent effective in proportion to its ingenuity and elaboration. When so simple as to be easily followed at once by the eye it produces the impression of commonplace. English bookbinding after the days of printing was very backward in an artistic point of view, and probably its progress at all was due, in the first instance, to foreign teaching, Nor does France seem to have been by any means the equal of Italy in the art, partly owing to the many difficulties placed in the way of the trade in France by social and governmental prejudices, for an account of which, as well as for much other interesting matter, we refer the reader to Mr. Cundall's pages. The particular example of binding which we have selected as a specimen of the illustrations is, however, French, of the seventeenth century. In this century a lighter and more fanciful style was adopted, for the most part, in place of the rather stiff patterns of the previous century. The specimen we are enabled to give we selected because it is an example of the employment of the elements which went to make the *cinquecento* designs, but carried out with much more freedom and fancy. The interlaced strap-work is less prominent and more ingeniously designed than in most of the Italian designs of the Renaissance; the foliage ornament is very pretty in effect, and not too artificial, and the numerous small scrolls which fill up the spaces are most artfully introduced. The whole presents the combination of richness of general effect with finish in detail, which is one of the best characteristics of ornamental design; and it is design entirely suited to its object, the giving

✠

* On Bookbindings, Ancient and Modern. Edited by Joseph Cundall, author of Ornamental Art applied to Bookbinding. London: George Bell & Sons. 1881.

BOOK COVER (FRENCH), SEVENTEENTH CENTURY.



richness to the cover of a book without introducing anything that interferes with the surface or with the convenient handling of the volume.

The remarks, in one of the concluding chapters, on the modern English binders and binding, are interesting and to the point. The author thinks, and is probably right, that books were never bound with greater technical skill than at present. But as far as the art side of it is concerned, "mere imitation of ancient work occupies too prominent a place," as, indeed, we observed at the outset of these remarks. He thinks that artists might do good by giving suggestive sketches, such as would put the bookbinding artisans on fresh tracks; and no doubt they may if they will. One artist who is also a poet, designed, we have no doubt, the cover of his own volume of poems, which is like no other book-cover we know of, and has the additional merit (as one might expect) of precisely suiting the character of the book. The frequent adoption of bindings quite at variance with the character of the book they contain is another point on which our author touches, and on which we quite agree with him. But it requires a fine and delicate taste to discriminate what is suitable in such a matter, to appreciate a subtle relation between the tone of thought of a book and the taste and character of the binding.

LONDON STREET ARCHITECTURE.

Nos. 7 & 8, BLOOMSBURY-SQUARE.

THE constant improvement of the Bloomsbury District, as opportunity serves,—by the care of the Bedford Office,—is a public advantage. To allow a neighbourhood to degenerate to mere lodging-houses or rough business premises, and eventually, perhaps, to be given over to squalor and dirt, till some public Act of Parliament or local authority is required to remove the nuisance, has been too often the fate of localities which only commenced their downward career by being unfashionable. Here rigid care in the construction of new buildings is being exercised to prevent such a calamity overtaking one of the most healthy and one the most convenient neighbourhoods of London, while the improvement of most of the hitherto objectionable districts adjoining has done and is doing much to render this again one of the most pleasant quarters of London. Yet much has to be done, and plenty of work remains for those who hold the very responsible position of landlords and householders in this part of the metropolis.

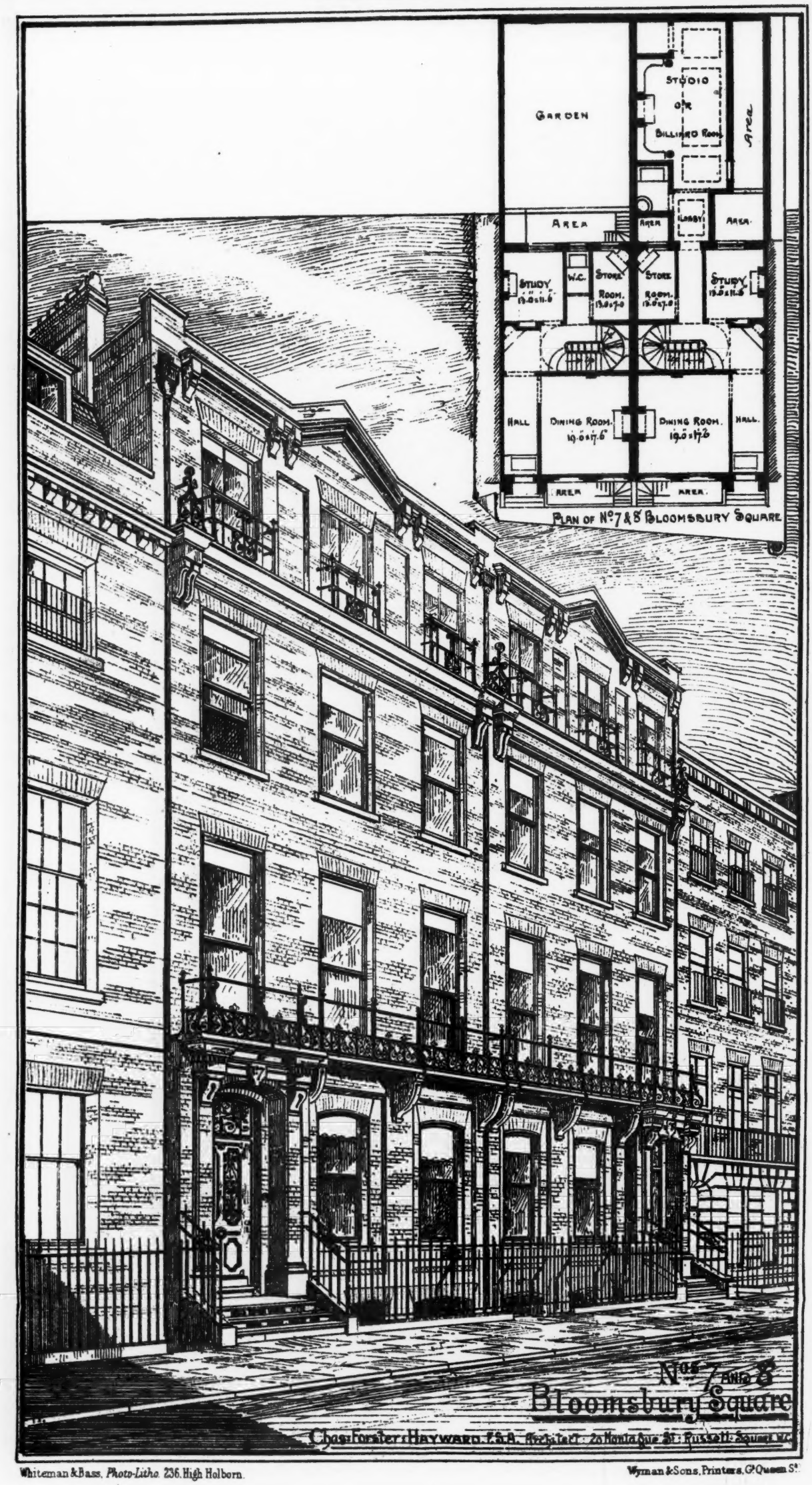
The want of some attention originally to sanitary and constructive details on the part of those who had control over the building estate, and, we may add, over the designing and carrying out of the work—(indeed, it is even now too frequently the case that estates are built upon without any architect or surveyor, and perhaps without any skilled plan-maker at all)—has been the cause of a continual crop of dilapidated houses, frequently coming under the dangerous-structure clauses of the Building Act, and causing endless annoyance and unforeseen expenses to leaseholders and owners alike, innocently contracting with each other in ignorance of the inherent defects of the buildings they are dealing with, till they show themselves in bulged walls, falling cornices and parapets, unstable chimney-stacks, and dangerous party-walls.

But we forbear to continue this subject, and will further only briefly refer to our illustration of two houses recently erected in Bloomsbury-square, for common letting purposes, and now both occupied as private residences. They are built simply of stocks with good facing bricks of yellow tone. There is a first-floor balcony, and one at the top-floor, making use of the main cornice of stone which crowns the second floor, and is carried on stone corbels. The chief features of the front are the architectural and useful treatment of the entrance-doorways, which, with some strong stone corbels, carry the balcony of the first floor, and the ironwork, which is carefully designed and put together. Small wrought ironwork scrolls protect the glass panels of the doors. The ground-floor being raised four steps from the pavement, a good elevation is given to the basement, so that the kitchens, &c., have an excellent light.

The plan shows the frontage to be about 25 ft. for each house, and the depth about 45 ft. On the ground-floor there is a good inner hall, with fireplace as well as a lobby and passage paved with encaustic tiles, 6 ft. wide. The staircase is spacious, and is not seen from the entrance, being placed behind the dining-room, 17 ft. 6 in. wide by 19 ft. At the back is the study, 11 ft. 6 in. by 13 ft., and a storeroom, 7 ft. by 13 ft., with a passage in the case of one of the houses to a large library or billiard-room in the rear, part of which is the actual remains of the picture-gallery of a celebrated artist who last inhabited the spot. The basement has the usual kitchen accommodation in the front, but the back has a good morning-room underneath the study, and of the same size, and a butler's pantry also under the ground-floor storeroom. The front of the first floor is entirely devoted to a handsome drawing-room, 24 ft. by 19 ft., entered from a spacious landing, and the back has a bed and dressing room (or small drawing-room and boudoir). The next two floors contain bed and bath rooms, housemaids' sinks, water-closets, &c.; these latter quite shut off and ventilated from the outer air by special skylights, &c. Taking the top-floor rooms as good dwelling-rooms,—and really some of the pleasantest rooms are situated at the top, and there are no attics and lumber-rooms,—the one house would contain seventeen or eighteen, and the other nineteen or twenty rooms, besides ample accommodations of closets, cellars, vaults, &c., back and front.

The cost, or such part at least as may be interesting to our readers to know of, may be set down at 4,500*l.* or 5,000*l.*, or about 8*d.* a foot.

The architect was Mr. C. Forster Hayward, F.S.A., of Montague-street.



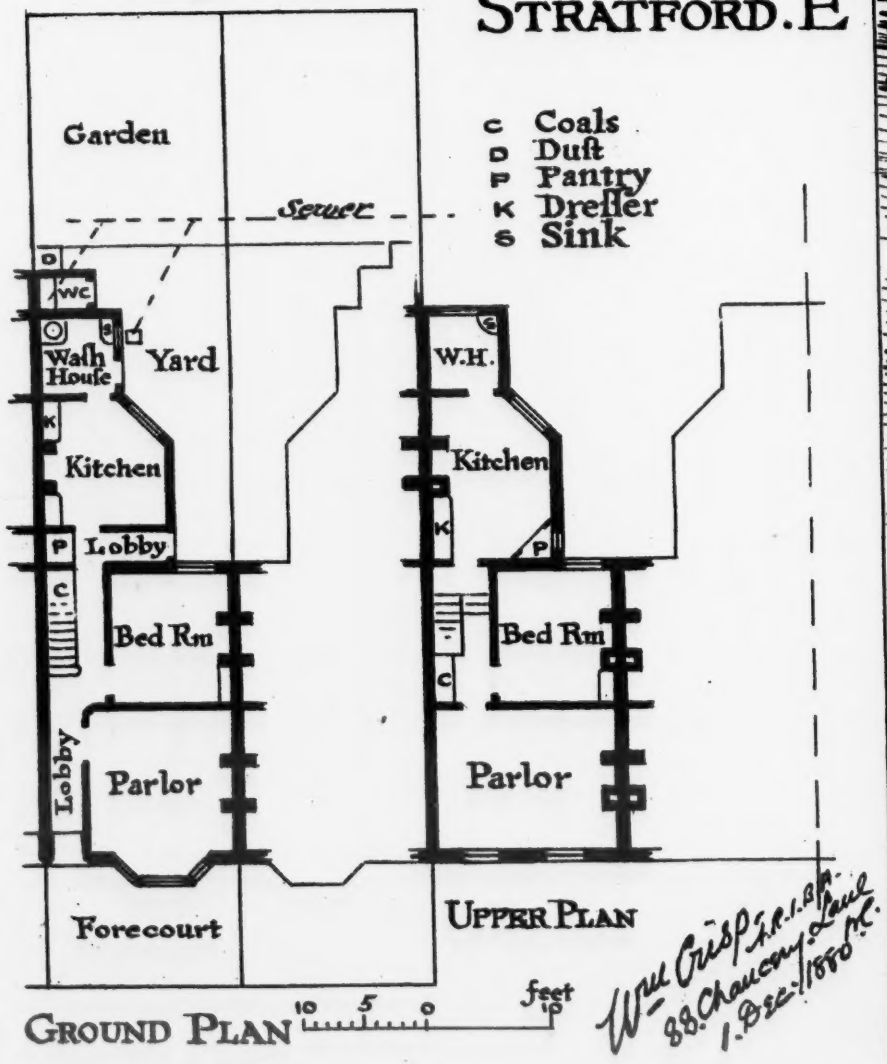
Whiteman & Bass, *Photo-Litho.* 236. High Holborn.

Wyman & Sons, Printers, 74 Queen St.

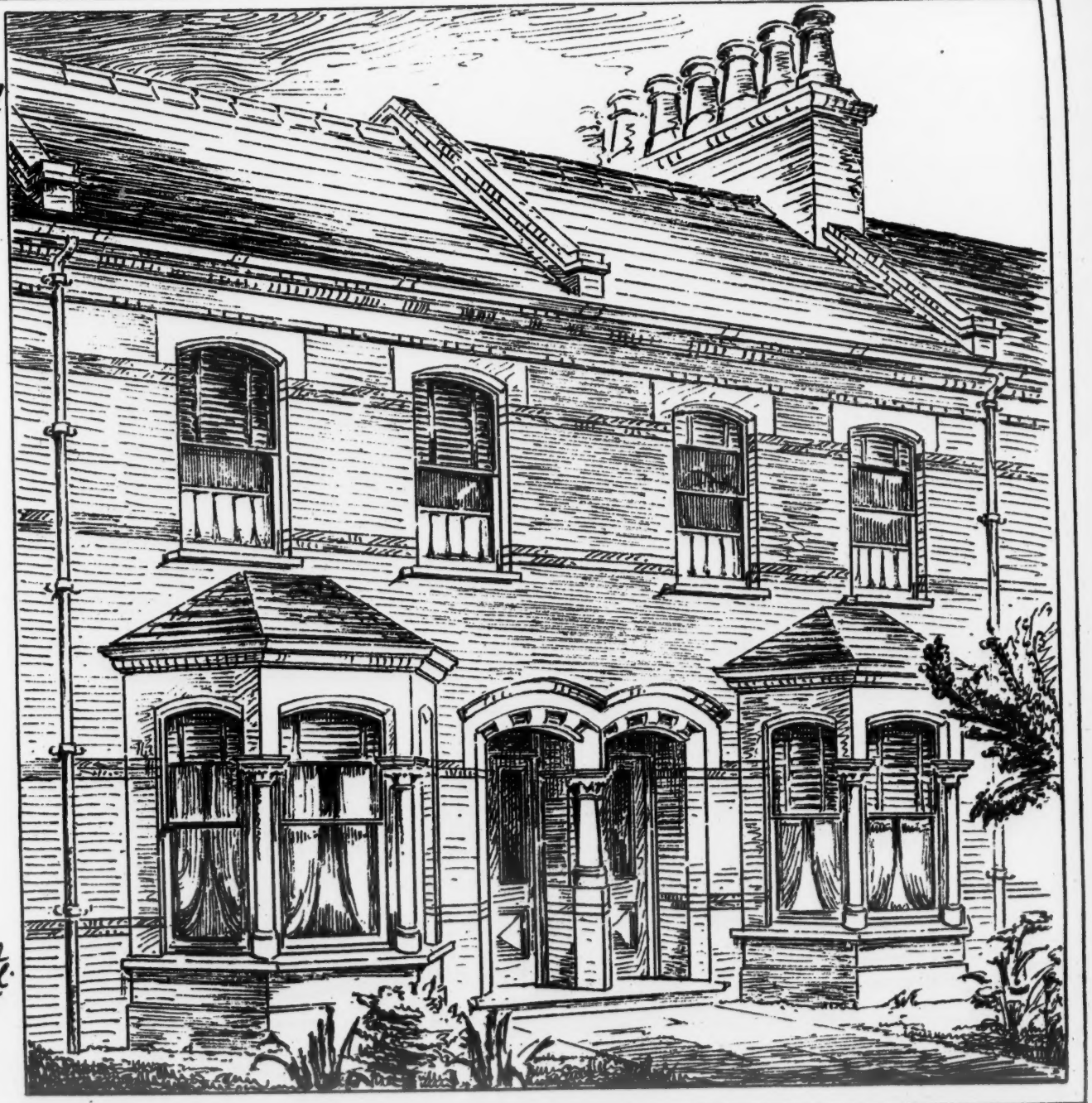
THE BUILDER, FEB. 5, 1881.

The REAL PROPERTY INVESTMENT ASSOCIATION *Ltd*

Crownfield Road Estate, STRATFORD. E



Wm Crisp F.R.I.B.A. 38 Chancery Lane 1 Dec 1880 M.C.



Whiteman & Bass, *Photo-Litho.* 236, High Holborn.

Wyman & Sons, Printers, G^t Queen S^t

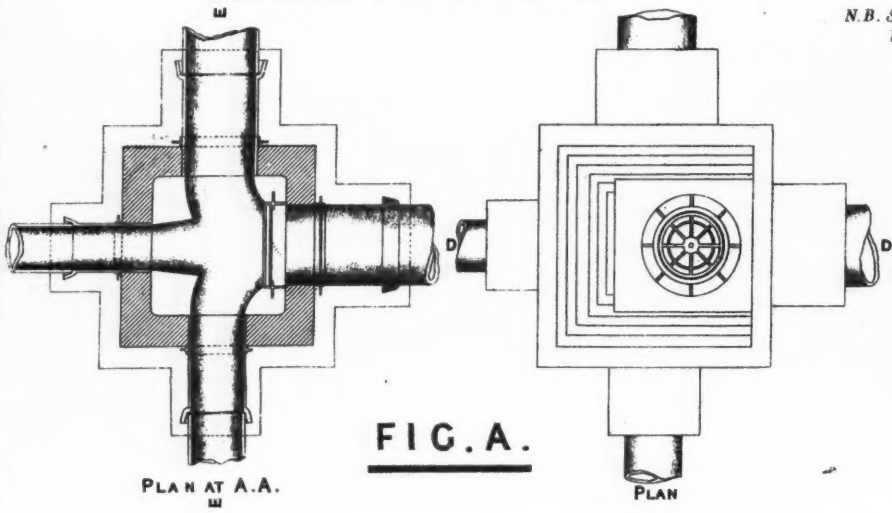
SUPPLEMENTAL

MANHOLES ON P

Having Steep Grad

N.B. See Printed description of Sheet No 1. The incoming Sewer on this Sheet No 1 [illegible] in each c having wood blocks to prevent jarring, in other respects the descriptions for [illegible] Sewers

MANHOLE WITH 21" SLUICE

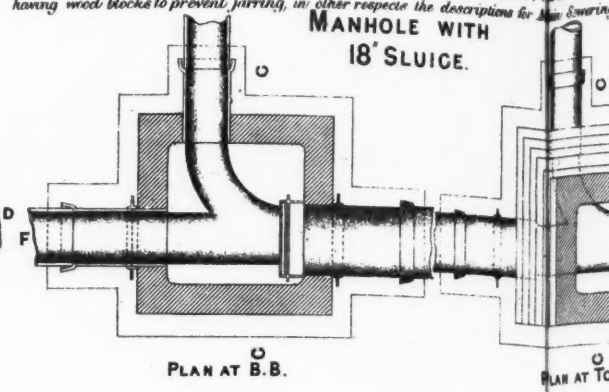


PLAN AT A.A.

PLAN

FIG. A.

MANHOLE WITH 18" SLUICE.

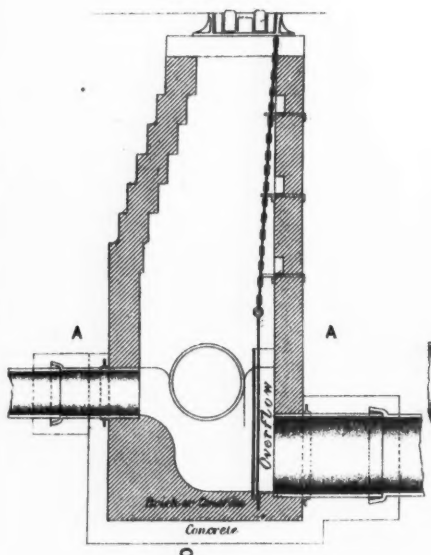


PLAN AT B.B.

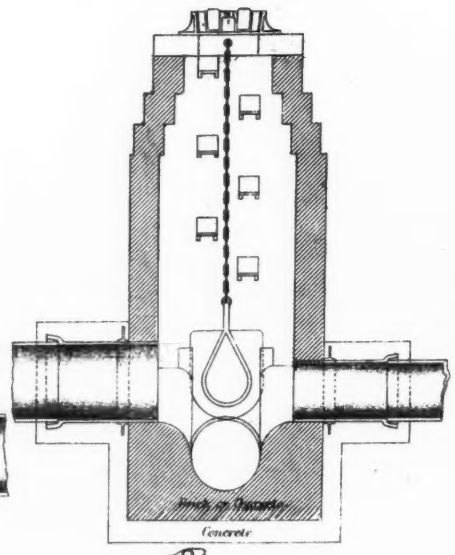
PLAN AT TO

FIG. B.

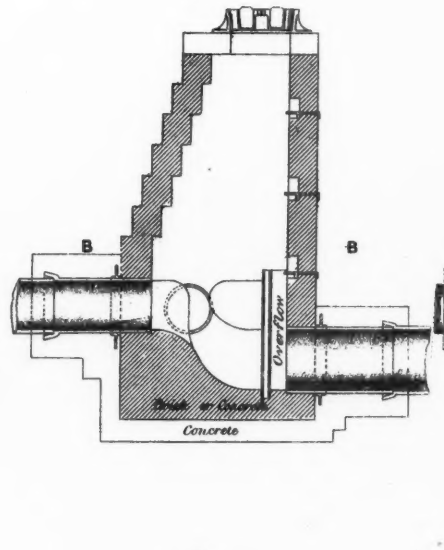
SECTION D.D.



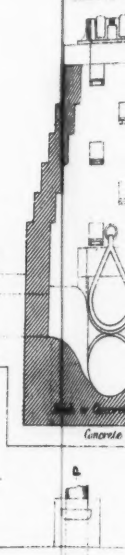
SECTION E.E.



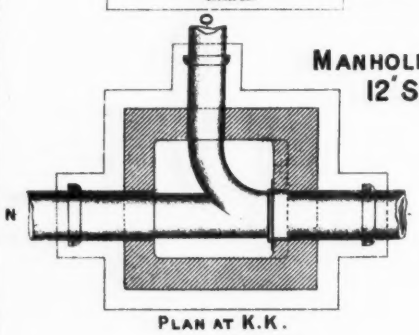
SECTION F.F



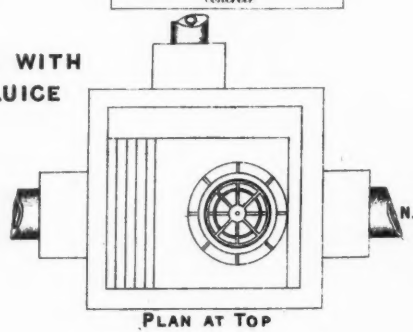
SECTION



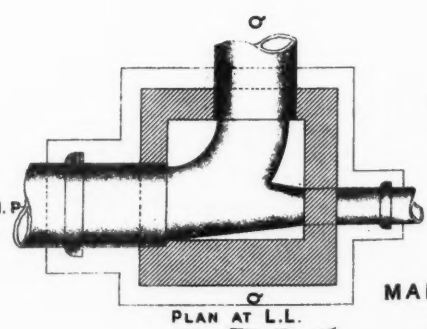
MANHOLE WITH 12" SLUICE



PLAN AT K.K.



PLAN AT TOP



PLAN AT L.L.

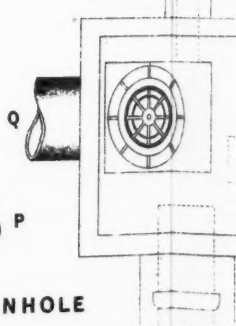
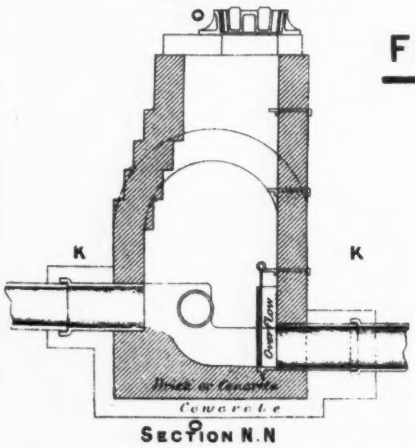
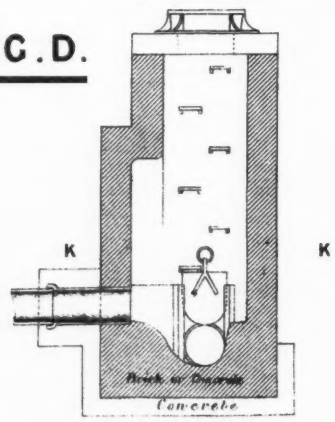


FIG. D.

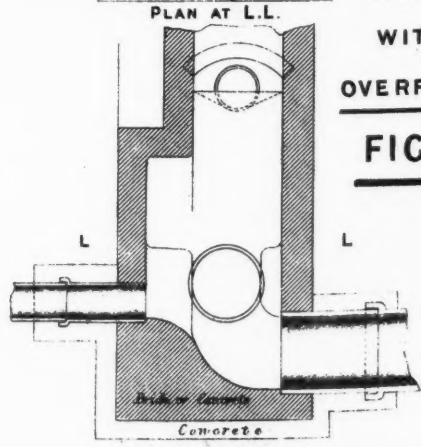
SECTION N.N



SECTION O.O.

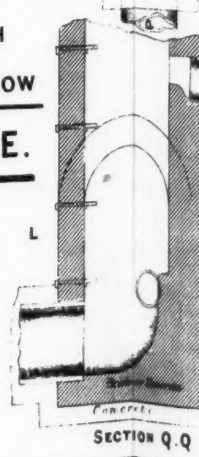


SECTION P.P.



MANHOLE WITH OVERFLOW

FIG. E.



SECTION Q.Q

Whiteman & Bass. *Photo-Litho* 236. High Holborn

MENTAL SHEET. No. 1A

N PIPE SEWERS.

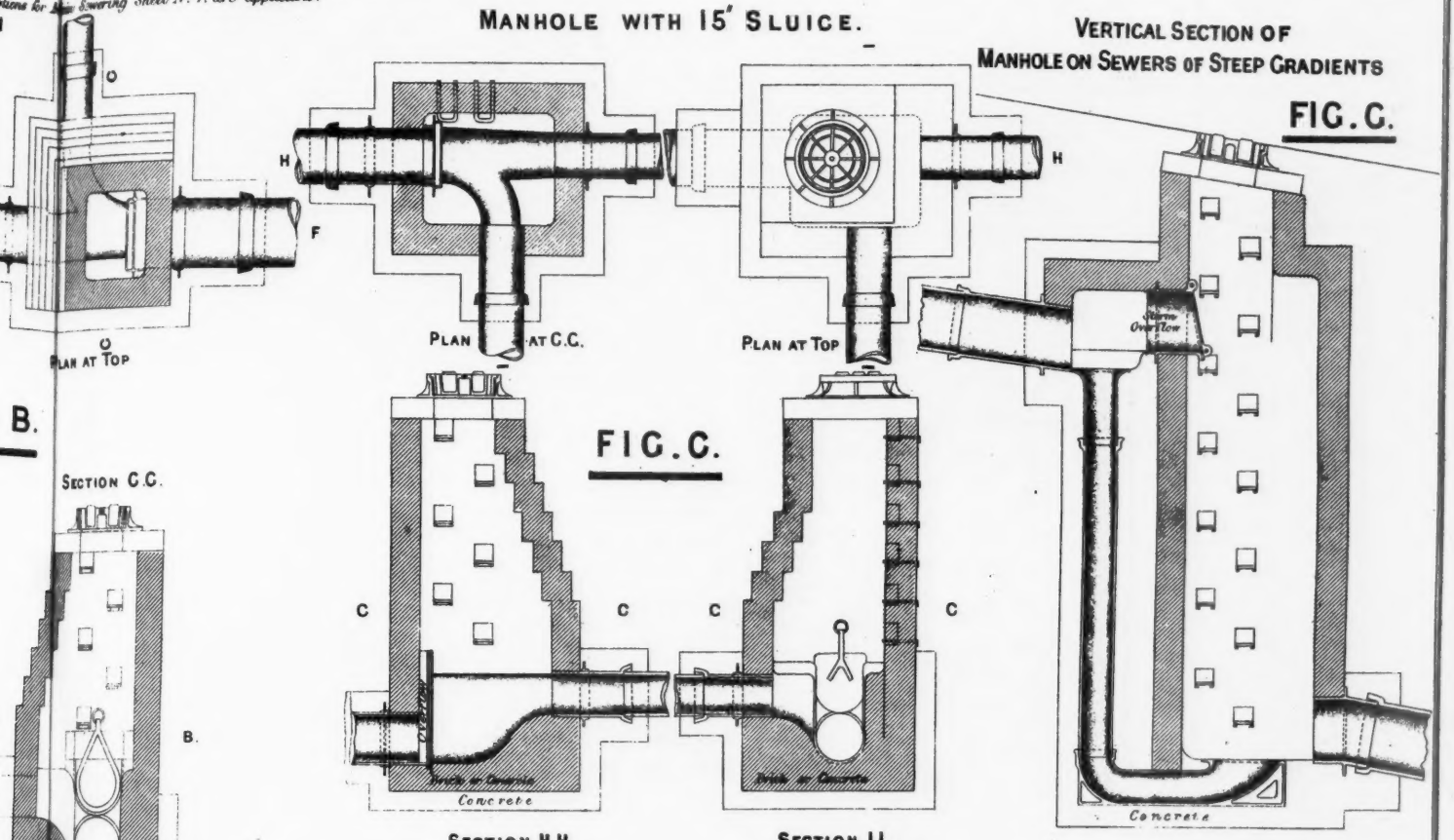
ng Steep Gradients.

heet No. 1 in each case its full diameter above the outgoing Sewer. The Manhole-Covers are circular
tions for New Sewering Sheet No 1. are applicable.

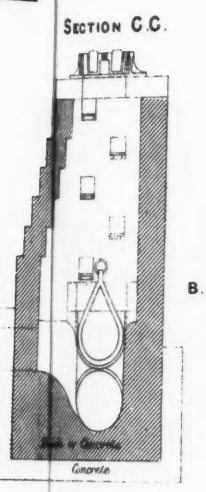
MANHOLE WITH 15' SLUICE.

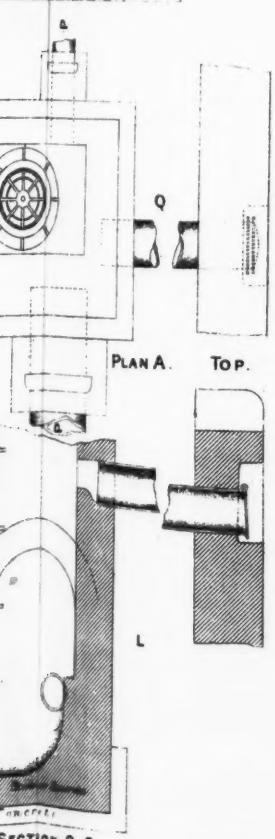
VERTICAL SECTION OF MANHOLE ON SEWERS OF STEEP GRADIENTS

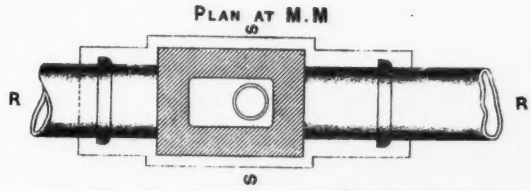
FIG. C.

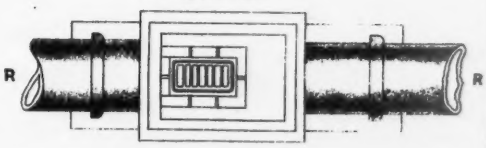


B.









VENTILATOR ON PIPE SEWER

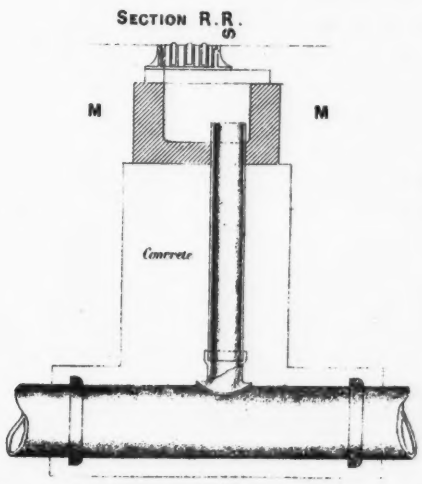
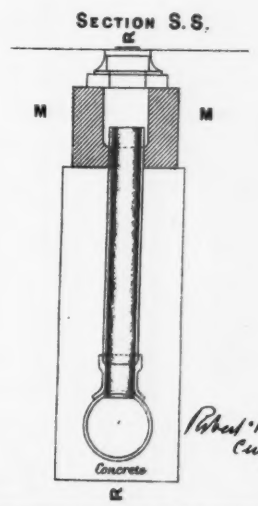


FIG. F.



Robert Rawlinson
Civil Engineer
London 1880

SCALE.

Wyman & Sons, Printers, 74 Queen St

CHAPEL OF CASTLE TRAUSNICHTS, LANDSHUT, BAVARIA.

CHAPEL OF CASTLE TRAUSNICHTS, LANDSHUT, BAVARIA.

WE have in a previous number given a view of a portion of the exterior of Castle Trausnichts, and also a small plan of the very singular chapel.* We now fulfil a promise we then made, of giving an illustration of this remarkable building. Externally there is nothing to distinguish the chapel of Castle Trausnichts from the rest of the range of domestic buildings,—of which it forms a part,—if we except a small flèche or bell-cot of the seventeenth century. Internally, however, the building possesses a peculiarity of arrangement which we do not remember to have met with elsewhere.

In plan the chapel is very nearly square,—it is about 40 ft. long by 35 ft. wide, and is singularly lofty for its small size.

At either end are stone galleries supported upon three segmental arches. Those of the western gallery are supported upon octagonal columns with richly-foliated caps; but, unfortunately, the capitals and columns of the eastern gallery have been modernised, though the ancient bases (thirteenth century) are left, and the arch-moulds appear to be original. Over the western gallery is a very picturesque closet, with glazed windows opening into the chapel, dating from the earlier part of the seventeenth century.

The eastern gallery supports a parapet adorned with a range of arches filled with seated statues of the apostles, most excellent examples of thirteenth-century sculpture, retaining their original coloured decoration. Unfortunately the centre niche, which had a projecting canopy, has not only lost its sculpture, but has been otherwise mutilated. Over this screen is a suspended rood, the ends of which are adorned with evangelistic symbols. Like the arcade, previously described, it retains its original coloured decoration, and it is a valuable article of Mediæval church furniture. The rood itself is suspended from a boss in the centre of the vaulting, but the attendant figures of SS. Mary and John stand upon the parapet. We had some doubt whether this arrangement was original; but, after a careful examination, we were convinced that there had never been any beam, and that both rood and figures were where they were originally placed. The wall at the back of the gallery, forming the upper portion of the east end of the chapel, is very curious and interesting; the centre is partly hollowed out, and partly projected forward, so as to form a baldacchino, the interior of which is semicircular in plan. The opening is a round-headed arch, which is flanked by two very early-looking niches, with strange attenuated figures, not unlike those in the western porch of Chartres Cathedral. The semi-dome of this curious baldacchino has been adorned with the painting of "a Majesty," which appears to have been very Byzantine in character, but has unfortunately been painted over some two hundred years back, and, what with the repainting and the decay of centuries, it is difficult to trace out the original design. The lower portions of the apse have been whitewashed, but the remains of the old decoration are visible in places; it was evidently that kind of conventional drapery of which the twelfth and thirteenth century decorators so frequently made use, and the prevailing colour appears to have been a kind of apple-green. The top part of the baldacchino is concealed by a painting on wood, probably fifteenth-century work, very much faded, and partly repainted. The altar is a perfectly plain solid mass of rubble, with a thin slab of stone which does not project beyond the edge. To the left of the baldacchino the wall is adorned with a most interesting little bit of arcade work, filled with a representation, in high relief, of the Annunciation,—a remarkably valuable example of thirteenth-century sculpture. The whole has been richly coloured, the drapery for the most part being green and white, and the background to the niches formed of a pattern stamped in gold.

The portion of the east end below the gallery is less interesting. The two piers supporting the baldacchino above form a kind of recess for the altar, and this is plainly vaulted, and forms a large niche containing a fine fifteenth-century figure of St. George with the dragon, richly painted and gilt, but unfortunately restored. To the left of the altar is a pretty little "sacramentshaus" of stone, probably dating from the end of the fifteenth century. Against the responds of the gallery are two small altars; the reredoses are formed by old pictures. These, however, are not in their real positions, as the triptychs which formerly belonged to these two altars were removed to the Pinakothek at Munich by order of King Louis I. Many of the churches in Bavaria have suffered grievously by that well-meaning monarch's ideas of protecting works of art. Surely it is as easy for a settled Government to protect such works *in situ* as to preserve them in museums, where they lose half their interest.

The old wooden gallery on the north side of the chapel is interesting as being a somewhat early example of such a feature in an ecclesiastical edifice.

* See vol. xxxvii., p. 1236.

TYPE DRAWINGS FOR MAIN SEWERING.

WE have reproduced a sheet of Mr. Robert Rawlinson's revised Suggestions for Main Sewering just now issued.

The modification consists in making the out-going sewer from each manhole lower than the incoming one to the extent of its full diameter, *i.e.*, the crown of the out-going sewer is level with the invert of the entering sewer. This arrangement, of course, can only be used where the gradient of the street is such that one can afford to throw away some of the fall.

The advantages which Mr. Rawlinson claims for this arrangement are,—that the branch sewers cannot be back-watered until the main sewer is running full. Hence there is less risk of deposit occurring.

Fig. G is intended to show a means of connecting sewers at different levels, as well as for reducing the velocity of sewage on steep gradients, and for checking the upward flow of sewage gases. This object has hitherto been very unsatisfactorily attained by allowing the tributary or higher sewers to enter the manhole at the requisite height above the main sewer; by this arrangement the sewage has a clear drop of many feet, and by the violent churning which occurs much stench is produced: by constructing an inverted syphon, as shown, all risk of annoyance from this cause is done away with. The syphon can be of small size to take the dry-weather flow, the storm-water being allowed to pass as shown. These improvements are capable of very extensive application in sewered towns.

This sheet contains plans and sections of manholes and lamp-holes, designed to be used with earthenware pipe sewers. Similar manholes may also be adapted to brick sewers, and where it is not convenient to enter at the centre of the street, a side-entrance approach from the footwalls may be made.

Fig. 1. Plans and sections of a manhole at the junction of two sewers, entering into a pipe-sewer which is turned at a right angle, having an arrangement for flushing. The manhole-cover is intended to act as a ventilator. The iron pail beneath the cover is to intercept any dirt which may come through the ventilating openings from the street or roadway above. This pail should be made to swing round when the manhole-cover is removed to admit of entrance. The bottom of the manhole may be formed out of stone or brick and cement, or be moulded in Portland lime concrete, with concrete for a foundation, as indicated.

Fig. 2. Plans and sections of a manhole over a single pipe-sewer junction similar to fig. 1.

Fig. 3. Plans and sections of manhole on pipe-sewer junction, with flushing arrangements indicated. A light iron sheet to be lowered or raised in a prepared groove, to stop back the flow of sewage or water, to be let off suddenly by drawing the sluice-plate. An overflow to be provided over the top of the sluice-plate when shut down to prevent the manhole from being filled above the level of the shut-down sluice-plate.

Fig. 4. Plans and sections of manhole, with slight variations from figs. 2 and 3.

Fig. 5. Plans and sections of manhole, showing overflow to relieve the sewer from storm-water.

N.B.—The head of water to be removed may vary considerably, so that the relief-pipe must be placed in the manhole higher or lower according as the house connexions on the sewers will permit.

Fig. 6. Plans and sections of lamp-holes and sewer ventilating pipes, to be fixed at the upper ends of sewers and drains, as well as at intermediate points betwixt manhole and manhole.

HEALTHY HOMES.

THE plans and sketch elevation which we give this week do not pretend to initiate any markedly new departure in the era of cottage building, so far as general design is concerned. For the perpetual erection of this type of dwelling seems to sanction the idea that it meets the requirements of the class for which it is provided. Hence, whilst the prevailing type has been retained, minor improvements have been introduced, and the Association has made efforts to redeem the property under notice from the reproach of "jerry" building and scamped work generally. It remains to be seen whether the cry against "mud" mortar and other abominations so often sent up in our columns will find echo substantial enough to justify the Association in extending its operations. We have visited the Crownfield-road Estate, a block of thirty-four houses between Stratford and Leyton, and we find most of them fitted up to accommodate two families; that is to say, there are kitchens with ranges and dressers, and sculleries with sinks and water supply, on both floors. The sinks discharge over open-trapped gratings in yards; and no drains are carried under any portion of the buildings. The ground-floor is kept well above ground level, and as the site is dry virgin gravel, and felt damp-course is said to have been used, there seems reason to expect the houses will justify the motto, "Healthy homes." Our inspection enables us to speak well of the work, and we hope the Rural Property Investment Association, Limited, under whose auspices the present experiment is being tried, will feel justified in developing on the same system their freehold estate of about five acres in extent near James-street Station, Walthamstow. The works are under the personal direction of Mr. William Crisp, A.R.I.B.A., of 88, Chancery-lane, surveyor to the Association.

MARIETTE BEY.

MARIETTE BEY, the well-known *savant* on all subjects relating to Egypt, has just died at Cairo.

Mariette was a Frenchman (from Boulogne), a man of middle height, with a strange, energetic face,—a genius, in fact, and his life was an exceptional one. Starting with a good education, he devoted himself, from taste, to the study of hieroglyphics. When about thirty years of age,—about 1848 or 1849,—he was attached as *employé* to the Egyptian Museum of the Louvre. His astonishing aptitude was not long in being discovered, and he was despatched to Egypt to seek what there remained of the Coptic manuscripts,—manuscripts immediately subsequent to the time of the first language of the Nile country. The mission confided to the young *savant* did not suffice him, and the idea occurred to him of seeking out the site of the ancient city of Memphis, buried underneath the sand. When he began his researches, he was treated,—as such men are at first treated,—as a visionary. But he took a happy revenge against his detractors in discovering the secular Temple of Serapis, the *Serapeum*, and the tombs of the Apis bulls. Europe enregistered these discoveries in 1851 with every expression of admiration. Mariette pursued his work, and discovered a year later the colossal Sphinx cut in the rock. In the course of his first works in Egypt he unearthed the no less celebrated table of Manéthon.

Manéthon, who was a priest of the time of Ptolemy Philadelphius, was guardian of the sacred archives of Heliopolis. The history of the primitive times Manéthon wrote is lost. The authors of the following epoch confirm its disappearance; but there were buried in the sand documents in stone of great value, such as the succession of the kings who had reigned before Rhamses II., and the hieroglyphic indication of their descent. Mariette reconstructed with the table of Manéthon the history of Egyptian royalty, remounting to the first dynasty. Champollion and his pupils could not mount higher than the eighteenth in fixing the epoch at Rhamses II.

From that time France accorded him the position he merited. He came back to that

country to receive some honour, but quickly returned to pursue his remarkable discoveries, which enabled him to re-make the history of Egypt.

Said-Pasha created a grand museum of Egyptian curiosities at Boulak, and Mariette was made director and guardian of it.

At the French Exhibition of 1867 Mariette Bey was made Commissary-General for Egypt, and transported to the Champ de Mars that marvellous Egyptian temple in which had been collected the curious antiquities of the Museum of Boulak. The three different epochs of Egypt were represented,—that of the Pharaohs, the Caliphs, and modern Egypt. Mariette in his scholarly ardour even tried to give a glimpse of what Egyptian civilisation was forty centuries before our era.

Witty, lively, poet, and philosopher, his conversation was instructive and amusing; but once get him on his favourite subject, his enthusiasm knew no bounds, and he carried his listeners along with him.

In 1875 he found in Abydos the ruins of a house of the twelfth dynasty. The foundations, intact, served to determine the size, the cornices allowed him to calculate the exact height, and with bits of the columns entire colonnades could be re-constructed; in fact, as with Cuvier, "bits" served to give an exact idea of how to form a whole.

The museum at Boulak, where the Khedive lodged him luxuriously, and had him respected as a "power" in the scientific world, contains inestimable treasures, and is alone worth a journey to Cairo. He had settled there with his wife and children.

HOUSE DRAINAGE, SEWERAGE, AND VENTILATION.*

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

The author of the paper said that he offered his remarks to the society, in the hope that they might give rise to a discussion commensurate in value with the importance of the subject to be discussed. He would not detain his audience with prefatory remarks further than with a few words on the causes which make the subject of the paper of so great interest, not only to engineers, but to the public generally. The author continued:—It is becoming daily more evident that life may be prolonged and health improved by the help of sanitary science, and though longevity is not necessarily an unmitigated blessing, strength to complete the daily task, and health to be contented, are calculated to add to the comfort of the individual, to the wealth of the community, and to the well-being of its component members.

It is not proposed to enter into the question of germ diseases or of their prevention, but to show how engineers may, by scientific knowledge and practical work, improve the condition of the public in regard to health. The first part of the question to be dealt with is the present condition of house-drainage and the remedies which should be used when that condition is found to be faulty.

It may be shortly stated that almost all houses, whether old or new, whether in town or country, are faulty as regards their sanitary arrangements, that the design is bad, and the workmanship worse, that drains are foul, traps ineffective to prevent the admission of sewer gas, that cesspools are frequent, and that the food and water are liable to contamination, the form of the appliances in use is objectionable, and they are placed in the most inconvenient and inaccessible places. It is not contended that in such houses disease is certain,—very far from it,—but the danger is great, and the atmosphere must be at the least as injurious to the constitution as the breathing of vitiated air generally is.

In the drainage of houses, the object to be kept in view is that the sewage matter should be removed as soon as possible, and entirely, so that there may be no fermentation, and that when it has left the house there should be no return of the gases evolved from it. To effect this, it is necessary that all pipes should be air and water tight, that the drains should be laid, if possible, outside the houses and in straight lines, both as regards direction and gradient, that they should be free from the walls, so that the settlement of the foundations does not affect them, and that they should be easily accessible. No connexion should be made with the drain inside the walls of the house, and a disconnecting and ventilating chamber, protected by a syphon trap, should be introduced between the drain and the street sewer. The closets should be placed outside the main walls of the house, and should be ventilated; the soil-pipe should be outside the house altogether, and should be carried of its full diameter to a point above the roof, and not near either windows or chimneys. The pan-closet and D-trap should be done away with, and an apparatus used free from angles and without space for the evolution of gas. The waste-pipes from cisterns, and safes of baths and closets, should be carried into the open air and no further, so that they may act as detectors, showing if the several valves are in order or not. The discharge-pipes from sinks, baths, and lavatories should be entirely disconnected from the main drain or soil-pipe, and should deliver, in the open air, on to the gratings of stoneware syphon gullies, which again should discharge into a manhole on the main drain. All bell-traps should be removed, and no trap of any sort in direct connexion with the main drain should be placed inside the house. The drain should be ventilated from the syphon near the sewer to its extremity.

Many cowls and other mechanical contrivances have been devised for increasing ventilation, but, in the opinion of the author, they either fail when most wanted, or are unnecessary. Cisterns should not be made of lead, but preferably of galvanised iron. They should be carefully covered, so that the water is not liable to be contaminated by foul air, and they should be placed in such positions that they can easily be got at, and where they are not liable to such contamination, and they should be frequently cleaned. There should be separate cisterns provided for flushing closets, and it should be impossible to draw any water from these except for that purpose. No cistern used for dietetic purposes, or for anything but the flushing of the closets, should have any connexion whatever with any drain, trap, or soil-pipe.

The main drain must be laid to such a gradient that it will be self-cleansing; that is to say, the fluid in it must have a minimum velocity of 180 ft. per minute. When such a drain goes under a house, which cannot always be avoided, the best material to be used is cast iron, jointed with tarred spun yarn, and leaded, and laid in a bed of Portland cement concrete. A diameter of 4 in. is amply sufficient for the drain of any ordinary house; such a drain, with a gradient of 1 in 30, will discharge 40,435 cubic feet per diem, the average discharge of a house being 40 cubic feet. All the sanitary arrangements of a house should be made as accessible as possible. A plan showing the position of the drains should go with every lease. It is hoped that before long wrought iron will supersede lead for pressure pipes.

With regard to house inspection, the subject seems to be little understood by householders. A mechanic is well fitted to examine into the condition of the pipes and appliances, but of the designing of sanitary arrangements he knows nothing, or less than nothing, for what he does know is faulty. It is almost useless to call in an engineer to examine a house unless he sees the whole of it, and it is equally useless to ask him to certify as to the condition of the house if the work has been carried out by the local builder from his report, unless he has seen the whole of the reconstruction.

The author does not think that compulsory inspections by officers appointed by the local authorities will satisfactorily meet the requirements of householders and the public.

Sewers.

When the sewage has passed the syphon-trap on the main drain the house should have done with it, but such is not generally the case; for even if the trap resists the return of gas in volume, the water in it absorbs gas on the side of the sewer, and gives it off on the side of the house. If the main drain is disconnected from the sewer by a ventilating manhole, any gas which may return is carried up the ventilating pipe, but, as drains are generally arranged, it passes into the house. The form and construction of the street sewer will greatly influence the house-drain, for with faulty form and construction there will be greater evolution of gas and greater danger of the trap being forced. Small pipes and drains should have a gradient which will produce a minimum velocity in them of 180 ft. per minute, large sewers should provide for a minimum velocity of 150 ft. per minute. If these velocities are not maintained deposit will take place, and the sewer will become an elongated cesspool.

The quantity of sewage to be discharged is constantly varying, but for practical purposes it may be taken that one-half passes away in eight hours. In a town of 200,000 inhabitants this will give a discharge at the rate of 1,000 cubic feet per minute for eight hours, and half that amount for the remaining sixteen hours. To meet this variation oval sewers have been designed in which the scouring action is more concentrated than in the circular sewer. In the form to which the following figures apply the transverse diameter is ⅔ of the vertical diameter, the radius of the invert is ⅓, and the radii of the sides 1⅓ the transverse diameter. A sewer of this form, 3 ft. 9 in. by 2 ft. 6 in., with a gradient of 1 in 900, will discharge 1,000 cubic feet per minute, with a mean velocity of flow of 167 ft. per minute, and 500 cubic feet with a velocity of 151 ft. per minute. This provides for nothing but the discharge of the sewage proper. If, however, the rainfall on an area of four square miles, at the rate of 1 in. in twenty-four hours, 80 per cent. of which finds its way into the sewers, be added, the dimensions will have to be increased from 3 ft. 9 in. by 2 ft. 6 in. and 7 ft. 6 in. by 5 ft., and the velocity will be with the same gradient and running full 241 ft. per minute, while when discharging 500 cubic feet the velocity will be 151 ft. per minute.

Drains must be provided for the removal of rain-water, but these may be taken to the nearest stream, and may be short and small, whereas if the sewer is used for this purpose it goes on increasing in size up to its outfall, which will generally be at a considerable distance, and must have capacity for both sewage and rainfall, unless storm-water overflows are provided, and these are clumsy and objectionable expedients.

Where pumping has to be resorted to the introduction of rain-water into sewers is especially to be avoided, for in the case quoted six engines and their boilers would have to be provided to remove the combined sewage and rainfall, while one would serve to remove the sewage alone.

However desirable it may be that the sewage should be separated from the rain-water, it must not be imagined that there are no difficulties in the way. Rain-water is in itself pure, but when it has washed down houses, streets, and foul refuse-heaps, it is no longer pure. In the separate system two drains would have to be provided, and workmen are so careless and ignorant that, unless special precautions were taken to prevent it, they would join up the house drains to either conduit indiscriminately. This arrangement would also add to the complication of our underground works.

As, according to Professor Rankine, the maximum velocity in drains should be 270 ft. per minute, these cannot be laid down steep hills, but should be contoured round them, and this should be done to prevent gases rising to the highest level, and then being forced into the houses. In low-lying ground it is difficult to maintain a velocity of 150 ft. per minute, and here in many cases flushing or pumping must be resorted to. If lift-pumps are used, the expense of plant, buildings, and ground is serious, besides the constant yearly charge for fuel, repairs, or attendance.

A short time ago the author had the pleasure of seeing an apparatus, designed by Mr. Isaac Shone, C.E., of Wrexham, at work, and he believes that it is well adapted for lifting the sewage of low-lying districts or for pumping water. The apparatus consists of a cast-iron globe, into which the fluid is introduced by gravitation and discharged by the admission of air under pressure; the action is entirely automatic; the machines can be placed under the streets, or in any convenient place out of the way, and are fed by an air-compressing engine placed in a central position. Sewer gas cannot return through the globe, and the exhaust air may be used for ventilating the sewer. The work done is proportionate to the amount of sewage to be lifted.

To return to the construction of sewers. The greatest care must be taken that the foundations are sound and that the material employed is well adapted to resist the acids contained in the sewage and the erosive action of water. Portland cement concrete pipes make good sewers for the smaller sizes, and the author believes

* Abstract of a paper read by Mr. Reginald E. Middleton, Associate Member Inst. C.E.

that similar concrete laid *in situ* would be better than brick for the larger sewers. Sewers should not meet on the level; the smaller should have a fall of half the larger diameter into the latter, and all junctions should be curved so as to offer the least resistance to the flow. Any bend has a retarding influence, which must be compensated by additional head. House junctions should be laid in when the sewer is built, even if not at once used, and they should point in the direction of the flow. All angles or causes of retardation should be avoided, as also any splashing, which will cause deposits. All sewers should be laid in straight lines, both as regards direction and gradient, so that their position may be known without difficulty, and they may be easily inspected and cleansed. The author is of opinion that sewering through the streets is to be preferred to draining along the backs of houses,—but this is a vexed question. All sewers should be ventilated, and it has been proposed to use lamp-posts and the chimneys of factories for this purpose; but there are strong objections to either practice. Ventilators have been closed in many cases because they smell, but in this case the fault is in the sewer, not in the ventilator; the former is foul, or it would not smell, and more ventilation is required, not less. The outlets of sewers should be protected by doors from the action of the wind. A very useful arrangement where the fall of the drains is small, or where it is desired to irrigate on a small scale, is the flush tank, which, when full, discharges its contents automatically by means of a syphon. The author believes that the arrangement designed by Mr. Isaac Shone, of Wrexham, is superior to that of Mr. Rogers Field, both in its certainty of action and in its cheapness. Both these arrangements are good protectors against the return of sewer-gas.

Sewage Disposal.

The author thinks that sewage should go to the land, and not be discharged into the sea. How the sewage is to be applied to the land must depend on many local considerations, but ordinary sewage farming seems to be the most natural and simple method. Intermittent filtration is only the same thing in a condensed form. Sewage farms do pay when they are not carried out on too grand a scale, and where they are not charged with amounts which in no way belong to them. The sludge is troublesome, but it may be collected in tanks, dried, and mixed with bone-dust or otherwise, and used as a separate manure, or it may, in some cases, be ploughed into the ground.

For the success of sewage farms the separate system is almost necessary; they cannot bear being deluged with rain-water at a time when they have already too much; and if this be admitted, the manurial value of the sewage, at no time high, is much reduced.

Many chemical processes have been devised for the treatment of sewage so as to render it innocuous and marketable as a manure, but the author believes none of them are successful either commercially or otherwise. The sludge has also been filtered, and pressed into cakes, the more liquid portion of the sewage only being passed on to the land.

Ventilation.

The author said that he had already taken up so much time that his remarks on ventilation must be few, that the subject is intricate and very much neglected, but of great importance. The quantity of air consumed by one person is from 3½ cubic feet to 5 cubic feet per minute, which must be replaced. One pound of coal uses 312 cubic feet, besides what is required for lights; this consumption is only at present provided for by faulty workmanship.

To avoid draughts, the supply of air necessary for the consumption of coal and lights should be introduced directly to them; but when this is done provision must be made for the circulation of air, otherwise it will become stagnant and unfit to breathe. Many mechanical means have been designed to meet this end, the best of which is perhaps the centrifugal fan; but there is also the direct effect of heat in producing circulation, and this is the power best adapted for use in houses.

The velocity of a column of air, 10 ft. high, falling into one 10 ft. 5 in. high, which difference of level will be produced by an increase of temperature of 20 degs. will be, according to Hood, 310 ft. per minute; therefore 310 cubic feet per minute will pass through a pipe of 1 ft. area. The difference of temperature between the outer and inside air will vary greatly at different seasons, and the dimensions of the ventilating-pipes must provide for this. One pipe can only be used for one level, for it will draw air always from the highest available point. This is a satisfactory way of abstracting heated and vitiated air, but the admission of fresh air is not so easy. If cold air be introduced direct draughts may arise; if heated air be used the mechanical power is lessened or lost. The author believes, however, that cold air may be introduced without draughts supervening, if the aggregate of the openings be large enough, while each individual opening is very small, and if the supply of air for the lights and coal be introduced to them direct.

THE STANDARD LIFE OFFICE, KING WILLIAM-STREET.

VISIT OF THE ARCHITECTURAL ASSOCIATION.

KING WILLIAM-STREET, though a comparatively new thoroughfare, having been formed and built only half a century ago as one of the approaches to the then new London Bridge, is beginning to be rebuilt. Near London Bridge, on the eastern side of the street, the Reliance Life Office has lately been completed, from designs by Mr. Fred. Chancellor, architect. Further northward, on the same side of the street, the Standard Life Assurance Company's Office,—a larger building than that just named,—is approaching completion, from designs by Messrs. Boulnois & Warner, architects, Waterloo-place, Pall-mall. As it was visited by the members of the Architectural Association on Saturday afternoon last (being the first visit of the season to buildings in progress), we are enabled to give some particulars of it.

The building has a frontage of 102 ft. 9 in. to King William-street, extending southwards from Post Office-court (a little to the south of the Church of St. Mary Woolnoth) to Abchurch-lane, towards which last-named thoroughfare there is a return frontage of 51 ft. 8½ in. The height of the façade from the ground level to the top of the parapet is 72 ft. The building contains five floors, including the basement and the top floor, but the fenestration only shows four floors, the windows of the top floor being behind the balustrade which surmounts the top cornice. The building is about equally divided internally into two portions by a party-wall, it being the intention of the Company to let out as offices the northern half of the building, retaining only the southern half for their own use. The façade consists of two orders surmounted by a boldly-projecting cornice. The lowermost order consists of red Aberdeen granite pilasters, resting on a massive and boldly-moulded stylobate, and surmounted by moulded caps carrying a cornice,—all of the same material. This order embraces the ground and first floors, the pilasters (exclusive of caps and stylobate) being nearly 23 ft. high,—each pilaster consisting of only two pieces of granite. The portion of the façade between these pilasters is of Portland stone, and contains the doors and windows of the ground-floor, and the windows of the first-floor. Above the granite cornice at the level of the second floor, the whole of the façade is of Portland stone, and consists of an order of three-quarter Corinthian columns, ranging with the granite pilasters below, having carved capitals, and surmounted by the top cornice already mentioned. Between these columns are the windows of the second and third floors. The return frontage to Abchurch-lane is treated in precisely the same way and in the same materials as the main frontage to King William-street. The very irregular shape of the site has called forth a great deal of ingenuity in planning, so as to make the best of the area available; for, almost immediately contiguous as it is to Lombard-street (one of the properties abutting upon it being the Bankers' Clearing-house), the value of the site may be reckoned at so much per square inch. An awkwardly acute angle at the northern end of the building has been utilised with advantage for the staircase to that portion of the building which is to be let out as offices; while much skill has been shown in the planning of the staircase in the Standard Company's offices so as to utilise to the best advantage another angle of the site. The basement of that part of the premises to be occupied by the Company contains extensive fireproof and burglar-proof strong-rooms, fitted with iron doors by Messrs. Chubb, of St. Paul's Churchyard. A tramway will be laid from the inside of these strong-rooms to a lift provided for the conveyance of the books up to the office. The basement of this part of the building also contains a lavatory and other rooms for the clerks, and the urinals and waterclosets, which are placed beneath the vaults underneath the pavement, an area, covered and top-lighted by Hamilton's prismoidal lights, intervening between them and the building. On the ground-floor is the general office of the Company, entered direct from King William-street. This apartment will be 40 ft. long in its greatest length in the direction of the main frontage, and 46 ft. deep from front to back in its greatest depth. Roughly speaking, it may be said that the office will be 40 ft. square. It will be provided with massive mahogany counter and desks, and that portion of the floor outside of the counter, and to which the public will have access, is paved with Minton's mosaic. The massive iron column in the centre of the office is covered with scagliola by Bellman & Ivey, and is to have a bronzed capital. The staircase to the upper floors leads up direct from the general office. It is of Portland stone, with moulded soffit, to the level of the third floor, and has very excellent cast-iron balusters, made to the special designs of the architects by the Coalbrook-dale Company. On the first floor is the Board-room, 30 ft. by 15 ft. 6 in. This apartment has (like the general office and some other apartments) a mahogany dado, and will have a mahogany chimney-piece by Messrs. Walker & Sons, of Bunhill-row. Adjoining the Board-room will be the secretary's room; and the remainder of this floor and the whole of the second and third floors will be devoted to rooms for the actuary, medical and legal advisers, and heads of departments and their clerks. The top or fourth floor, reached from the third floor by a wooden staircase, will be principally used as a residence for the housekeeper. The northern half of the building, which is to be let in floors or parts of floors as mercantile offices, is, of course, somewhat different in its arrangements. The staircase is not so wide, but has a dado of brown and green glazed tiles by Messrs. White & Co. Part of the basement is also intended to be let as offices, the use of the prismoidal pavement lights before mentioned rendering this possible. The stoves and marble chimney-pieces throughout have been supplied by Messrs. Wright, of Queen Victoria-street. The steps of the thresholds to both portions of the building are of Craigleith stone. The red Aberdeen granite used in the façade was supplied, worked, and polished ready for fixing by Messrs. Macdonald, Field, & Co. The gasfitting, electric bells, and speaking tubes (as also the hot-water heating apparatus used as an auxiliary to open fire-places in the general office of the company) have been supplied and fixed by Messrs. Land & Co., of Stratford. The carving of the stonework of the façade has been executed by Mr. Kelsey. That portion of the building which is to be occupied by the company is being dried by Messrs. Dreyfus & Co., the licensees of Ligny's process. The floors throughout are of iron and concrete construction. It may be added that the building occupies the site of the old City Carlton Club, which was found to have been erected on a bed of concrete 4 ft. thick over the whole area. As it was necessary to have a deeper basement for the new building, this bed of concrete had to be removed. Beneath it was found a layer of made ground, consisting partly of ashes supposed to be due to the Great Fire of London. No antiquities of any kind were found, although the site was excavated over the whole area until the gravel was reached, which in some places (notably at the corner of Abchurch-lane) necessitated excavation to a depth of 30 ft. The contractors are Messrs. Perry & Co., of Tredegar Works, Bow, whose foreman on the building is Mr. Wheatley. The cost of the building will be about 30,000*l.*, of which 5,000*l.* is for the granite.

Mr. Warner was kind enough to conduct the visitors over the building, assisted by Mr. Stanley, the clerk of the works.

Proposed Font for the Parish Church, Sheffield.—In reply to a question on this subject, Mr. Hems writes to say,—"The award in this matter was in favour of Mr. Charles Green, of Sheffield, and that artist is now engaged upon the work. Mr. Green is neither an architect nor a statuary, but is a clever modeller of the late Mr. Stevens's school. His sympathies do not draw him towards Gothic work.

LEICESTER ARCHITECTURAL SOCIETY.

IN the place of their annual dinner the president and committee of the Leicester Society of Architects determined this year to give a *conversazione*, which was held in the rooms of the Literary Institute, Museum, and School of Art on Thursday evening, the 27th ult. There was a fine collection of works of art. The great hall was filled with water-colour drawings by David Cox, De Wint, G. Barrett, Cattermole, and other artists of the old school, and by J. D. Linton, W. Pilsbury, J. Fulleylove, Harry Ward (these last three local artists), J. Enoch Langhorn, and R. Phené Spiers. On the walls above the drawings were cartoons for stained glass by Mr. Holiday and Mr. Shields, contributed by Messrs. Heaton, Butler, & Bayne, and against the platform a series of large plaques painted by Miss Spiers.

One end of the hall Messrs. Trollope, of London, had filled with fine specimens of old tapestry, modern carved furniture and specimens of the modern faïence of all Europe, collected by Mr. G. T. Robinson, who came specially to arrange them. At the other end was a fine collection of embroidery and art needlework, specially lent by the president (H.R.H. Princess Louise) and the committee of the Ladies' Work Society, 31, Sloane-street, among the specimens being some of Her Royal Highness's design and workmanship.

The rooms of the School of Art were furnished by Messrs. Collinson & Lock with Persian carpets, cabinets, and other furniture; by Messrs. Richardson & Ellson, of London, Messrs. Elgood Brothers, of Leicester, and Messrs. Smith & Son, of Birmingham, with brass work of various kinds, some *repoussé* panels of Messrs. Elgood being especially remarkable; by Mr. Noble and Messrs. Cort & Paul (both local art-manufacturers) with furniture, grates, and specimens of art pottery of various kinds, the walls of the large room being decorated with a series of finished cartoon drawings by Mr. H. W. Lonsdale. In part of the Museum the walls were hung with Japanese drawings and the cases covered with Japanese embroidery lent by Mr. Cutler, and with Persian carpets lent by Dr. Dresser. The president (Mr. Joseph Goddard) received the guests (who numbered close upon 500) in the large hall. There was a band of music under the direction of Mr. A. C. Nicholson in the conservatory, where every available portion of wall was decorated with the designs of the principal Leicester architects, including Mr. Ordish (whose own drawings were specially remarked) Messrs. Shenton & Baker, Mr. Millican, Messrs. Goddard & Paget, Goodacre, Borrodaile, and others. The Leicester people seemed to be especially pleased with the exhibition, and great regret was expressed that the works of art could not be left on view for a week. It was arranged, however, that the water-colour drawings, lent principally by Messrs. W. S. Hobson, George Hodges Viccars, J. Orwell, and J. Goddard, should be left in the Great Hall till Tuesday. On the following day, Mr. Goddard, the president, gave a luncheon in the Assembly Rooms to some of the principal guests and the members of the Society.

THE NATIONAL ASSOCIATION OF MASTER BUILDERS OF GREAT BRITAIN.

THIS Association held their sixth half-yearly meeting at the Palatine Hotel, Manchester, on Wednesday, the 26th of January, 1881, when the following towns were represented:—London, Liverpool, Manchester and Salford, Lancaster, Wolverhampton, Bradford, Northampton, Lincoln, Leeds, Warrington, Wigan, Birmingham, Sheffield, Huddersfield, Portsmouth, Doncaster, Edinburgh, Dundee, Rochdale, Crewe, Macclesfield, Bolton, Kidderminster, Staleybridge, St. Helen's, Hull, Oldham, and Meltham. The report of the council and accounts for the last half year were adopted, and directed to be circulated.

The following gentlemen were elected as officers for the ensuing year:—Mr. Stanley G. Bird (London), president; Mr. W. H. Cowlin (Bristol), Mr. Robert Neill, jun. (Manchester), vice-presidents; Mr. Edward Hughes (Liverpool), treasurer. Mr. Thomas Clay, Manchester, the late president, was elected an honorary vice-president.

The council reported that they had great pleasure in bringing prominently before the notice of the Association that the National Association of Master Painters of Scotland, whose deputation attended the meeting at Bristol, had joined the Association; and it is hoped that the various associations of master builders in Scotland will see their way, before the next half-yearly meeting, to join. It was decided to increase the number of gentlemen forming the council from twenty-one to twenty-five, and representatives from Edinburgh, Bolton, Hull, Sheffield, and Portsmouth were elected members. It was also decided, on the invitation of Mr. Stanley G. Bird, to hold the next half-yearly meeting in London.

The question of extending the Association was considered, and this was recommended to the consideration of local associations, who were requested to take this matter up in their respective neighbourhoods, with a view of increasing the number of local associations.

The question of the liability of employers, under the Employers' Liability Act, 1880, was next considered, and after some considerable discussion, during which several schemes of insurance were submitted by the sub-committee appointed for that purpose, it was decided to refer the question back to them for further consideration, and to bring the matter to maturity at the earliest possible date.

After the meeting, the members of the council and other gentlemen from local associations in the immediate neighbourhood were entertained at dinner by the members of the Manchester and Salford Builders' Association, over which Mr. William Southern presided, supported by Mr. Robert Neill, J.P., and Major Bird, of London.

MONOLITH TO RECORD THE SITE OF THE EXHIBITION OF 1851.

THE Council of the Society of Arts have come to the decision that it is highly desirable to record, by a monolith, the site of the great Exhibition of the Works of Industry of all Nations, held in 1851 in Hyde Park, and they propose to raise the necessary funds by a public subscription. A deputation, consisting of Mr. Bramwell, chairman of Council, Sir Henry Cole, Mr. Owen Roberts, and Dr. Richardson, have waited on the Chief Commissioner, who expressed his wish to have a design of the work proposed, when he would lay it before Her Majesty's Government. It will be remembered that a considerable sum of money was raised some years ago to erect in Hyde Park a memorial of the Great Exhibition, and that through the caprice of Her Majesty's then Chief Commissioner of Works, the monument, one of the best, if not the very best of the kind in London, was shut up in the Horticultural Gardens. The present movement, the result of a strong feeling that the site ought to be marked, serves to show what tomfoolery goes on at times in this country under the name of Government. We hope the present endeavour may be successful.

MEDALS FOR SANITARY ARRANGEMENTS.

THE Society of Arts are offering medals for plans showing the best sanitary arrangements in houses built in the metropolis, such plans to be exhibited in the Society's Rooms, Adelphi, in June, 1881, and to be sent in on or before the 12th of May next.

1. One silver medal will be awarded for the best sanitary arrangements carried out and in satisfactory working in a house let out in tenements to artisans, for which a weekly rental is paid.
2. One silver medal for the best sanitary arrangements in actual satisfactory working, in a house of the yearly rental of from 40*l.* or less to about 100*l.* in value.
3. One silver medal for the best sanitary arrangements in actual satisfactory working in a house of the yearly rental value of 200*l.* and upwards, to any amount.

The houses must be open to the inspection of the judges, who, in considering their award, will be guided by the suggestions of plans for main sewerage, drainage, and water-supply, made under the Public Health Act, 1875.

The conditions may be obtained from the secretary.

The names of the architects, surveyors, or sanitary engineers who directed the sanitary arrangements are asked for, and certificates will be awarded to those whose plans obtain the medals.

Mr. G. C. Henderson has been appointed architect to the Royal College of Surgeons in Ireland, in the room of Messrs. Miller & Symes.

ST. MARK'S, VENICE.

AT a general meeting of the St. Mark's, Venice, Committee, a vote of thanks was unanimously passed to Commendatore Azzurri, President of the Academy of St. Luke, Rome, for his expression of opinion, at a special assembly of the Academy, on the subject of the preservation of St. Mark's. The committee, finding its own sentiments so admirably set forth in the statement of the President, is desirous for the future, to acknowledge the Academy of St. Luke as the centre and channel for any observations which it may find necessary to make on the subject.

SIR JOHN SOANE'S MUSEUM.

THE Trustees met upon the 20th of January to receive the report of the curator, Mr. Jas. Wild, and to audit the accounts of the past year.

The public season of Sir John Soane's Museum, in Lincoln's-inn-fields, began on Tuesday last.

During February and March it is open to the public on Tuesdays and Thursdays. In April, May, June, July, and August it is open on Tuesdays, Wednesdays, Thursdays, and Saturdays.

We are happy to be able to state that the number of visitors to this Museum still continues steadily to increase, as the following figures sent to us by the curator will show:—1880, 4,084; 1879, 3,230.

Those who wish to refer to the books in the library, or to copy from the drawings, casts, pictures, &c., have to write to the curator beforehand for permission, which is always given if the request be supported either by a letter from one of the trustees, or from a member of the Royal Academy, or the Royal Institute of British Architects, or from the headmaster of any public school of art.

The number of students has also considerably increased. In 1880 forty-one students attended on 163 days; in 1879 twenty-four students attended on forty-seven days.

SALES OF BUILDING LAND.

LAST week Messrs. Baker & Sons offered for sale, at the Auction Mart, eleven freehold building plots at Muswell-hill, adjoining the Muswell-hill-road, and close to the Alexandra Palace. The several plots have frontages of 18 ft. each, with a depth of about 80 ft., some of them facing the Alexandra Palace, and others having frontages to Muswell-hill-road and Muswell-hill-place. All the plots were sold, realising in the whole 400*l.*, or about 40*l.* per plot.

On Monday, Mr. Richard J. Collier offered for sale, at the Auction Mart, a freehold piece of land, known as "Little Hill Field," Buckhurst-hill, in the neighbourhood of Epping Forest, containing an area of two acres, and eligible for the erection of either a public institution, a villa residence, or for cottages. The land was sold for 300*l.* Mr. Collier also offered, at the Chequers Inn, Marsh-street, Walthamstow, on the evening after the great snowstorm, the Black Horse-lane Estate, Walthamstow. The number of lots offered was 183, one portion having frontages of 16 ft., and a depth of 60 ft., and another portion having 30 ft. of frontage, and a depth of 155 ft. The severe weather, to a certain extent, interfered with the sale, but there was still a tolerably numerous company, and about three-fourths of the estate were sold, the smaller plots realising about 47*l.* per plot, and the large plots 136*l.* each. The total proceeds of the sale amounted to 7,122*l.*

COMPETITIONS.

Hospital, Kendal.—The designs of Mr. D. Brade, of Kendal, for the proposed hospital for infectious diseases in that town, have been selected by the Corporation.

Pontefract Town-hall.—The authors of the design placed first in this competition are Messrs. Perkin & Bulmer, of Leeds, and not Mr. Perkins, as originally forwarded to us.

The National Portrait Gallery.—A recent outbreak of fire here, although fortunately soon suppressed, suggests an anxious inquiry as to the safety of the pictures where they are now placed. Is the building fire-proof to any extent?

OBITUARY.

Mrs. S. C. Hall.—We hear with the deepest regret of the death of this well-known writer and universally esteemed lady. For fifty years and more Mrs. Hall has been writing, and, either singly or in conjunction with Mr. Hall, has produced a vast number of books, tales, novels, plays, and descriptive works, all calculated to better as well as to amuse. This is not the place to give a list of them or to estimate carefully her position in the world of letters, but it will, of course, be done elsewhere. Her Irish stories and her works on Ireland generally, were written with the view of making known the good points of the Irish character, and inducing sympathy in this country, and were largely successful, and widely recognised. Her name is mentioned with regard by persons of all classes in Ireland. Mrs. Hall departed this life at her residence in East Molesey, Surrey, on Sunday evening last, at nine o'clock. The funeral is fixed to take place at Addlestone on this, Saturday morning. A more admirable woman, in every relation of life, we have never known; her memory will be prized most by those who knew her best.

Mr. Alfred Elmore, R.A., died on the 24th ult., aged 66. He exhibited his first picture at the Academy in 1834, and was elected an Academician in 1877.

MASONS' MARKS.

SOCIETY OF ANTIQUARIES.

At the ordinary meeting of the Society on the 20th of January, Mr. Freshfield, V.P., in the chair, Mr. R. S. Ferguson made a communication on the supposed discovery of the "Labarum" on the exterior wall of Carlisle Cathedral, reported by Precentor Venables in the *Athenæum* of the 8th of January. Mr. Ferguson held that it was nothing more than one of not less than twenty examples found on that building of the well-known mason's mark called the hour-glass, which may be described as a St. Andrew's cross, with its upper and lower angles closed, and then laid prone on its side. A common addition to this mark (as here found) is a vertical line passing through the centre, parallel to, and of the same length as, the lines already spoken of as barring or closing up the angles. This variety occurs on the exterior walls of the nave and on the fratry, a building of much later date than the nave. The particular mark mentioned by Mr. Venables is on one of the dark grey rectangular blocks on the eastern face of the southern buttress of the fragment of the nave, about 8 ft. from the ground. At the top of the vertical line, just mentioned as a variant of the hour-glass mark, is a flaw or mark in the stone, somewhat in the shape of a D, which is obviously liable to be mistaken for the loop of the Greek *Rhô* or P. Adopting the *Athenæum* report of the meeting, Mr. Ferguson's reasons for not believing this particular mark to be the "Labarum" are as follow:—1. The presence of the two unmistakable vertical lines closing the angles of the supposed letter X. 2. The obtuseness of the upper and lower angles, they being about 120°, which is fatal to all resemblance to the Greek *Chi*. 3. The upright stroke of the D-shaped flaw does not join on to, *and is not even in the same line with*, the vertical line already mentioned as passing through the centre of the St. Andrew's cross. 4. The occurrence on the same face of the same buttress, on a similarly-coloured and similarly-tooled stone, of this identical mark of the prone hour-glass with its vertical line, without the slightest resemblance to the "Labarum." 5. The repeated occurrence on other parts of the nave and on the fratry of the same hour-glass mark, without any vestige of the "Labarum."

Mr. J. Evans agreed with Mr. Ferguson.

The Secretary (Mr. Knight Watson) observed that credit was, he thought, due to Mr. G. E. Street for the care he had taken in directing examples of mason's marks to be collected; and also to Mr. Creed, the clerk of the works. The four plates exhibited that evening contained 315 examples.

The Chairman expressed a hope that some systematic effort would be made to collect together mason's marks from all parts of the world, so as to be able to form some idea of the date when they first appeared, and of the purpose for which they were made. He had himself collected many examples in Spain and also at Constantinople. At the latter place he believed they were merely intended to mark the place to be occupied by the particular stone. They consisted there of letters of the alphabet.

Speaking for ourselves, and having seen the outline of the supposed "Labarum," we have no hesitation in saying that it is an ordinary Mediæval mason's mark. We are glad of the mistake that was fallen into, since it has served again to bring before the Society an interesting subject, first treated of in England in their own *Archæologia*, and concerning which there is yet much to be said.

TENDERS FOR PUBLIC WORKS FOR THE CORPORATION OF LINCOLN.

The following were the tenders for contract No. 7, house connexions, Lincoln Sewerage Works. They were by schedule of prices only, but an approximate calculation of the work to be done, based on these schedules, made the tenders, we are informed, rank as follows:—

Kellett & Bentley, Sidcup	£44,293 15 0 !
Packer & Co., Stourbridge	35,512 10 0
Cowen & Lansdown, Lincoln	27,856 5 0
Binns Brothers, Lincoln (accepted)	20,443 15 0
Carder, Lincoln	16,093 15 0 !

For the construction of boundary-walls in Brickyard and Rudgard lanes:—

	Brickyard-lane.	Rudgard-lane.
Buttery & Gadd, Lincoln	£211 8 6	£130 0 0 !
Mills & Cressy, Lincoln	89 16 0	56 15 0
Slingsby, Lincoln	71 0 0	60 0 0
Binns Brothers, Lincoln	69 15 0	45 10 0
Crosby & Sons, Lincoln	67 0 0	47 0 0
Otter & Broughton, Lincoln	54 0 0	36 10 0
Cowen & Lansdown, Lincoln	50 0 0	48 10 0
Priestley, Lincoln	—	49 0 0
Wright, Lincoln (accepted)	39 10 0	36 10 0 !

We leave the differences to speak for themselves; they are beyond explanation.

THE BOARD-ROOM FOR THE SCHOOL BOARD.

The large meeting-room in the house of the School Board for London, on the Embankment, has been warmed and ventilated on a principle extensively introduced in the United States during the last few years by Mr. L. W. Leeds, that is, "by direct radiation from exposed surfaces at or near the floor, placed on the colder sides of the rooms. These surfaces are warmed by steam at low pressure, never exceeding 5 lb., or one-third of the atmospheric pressure. The cold air is introduced in large quantities, and directed upwards, so as to be well diffused before falling upon the occupants. The air is not heated, but remains cooler than the indicated temperature of the rooms, thus giving it the desired freshness and invigorating influence." The extract is from the ceiling.

The heating surface in the board-room consists of four ordinary coils of very small pipe, two at each end of the apartment, and a somewhat larger pipe, which runs round the room above the dado, at the foot of the windows. We shall be curious to hear of the result on a thoroughly cold day. If "the air is not heated" by the coils, we certainly should not expect to find members in the body of the room complaining that they are too warm. The work, which includes a considerable boiler in the basement, has been executed by Messrs. Longden, under the supervision of Mr. Robson, the architect of the Board.

JOINERS' GLUE.

Sir,—Let your correspondent try *strong* acetic acid from a chemist (by *no* means buy it diluted), and I think he will find his glue dissolve much more freely than by using water, and that it will be rendered much more tenacious, and keep well.

It may require an enamelled vessel to boil it in, but of this I am not sure; the only objection, I think, is that it may require a longer time to set.

ANOTHER READER.

PROTECTION FROM FROST.

Sir,—The late reduced temperature has so interfered with the water supply of our smaller houses,—where fuel is none too plentiful,—as to cause much real suffering. You might do valuable service if you could authentically inform us what precautions are taken against frost in arranging the water supply of houses in such a city as New York, where the cold is much more severe than here, and of much longer duration. In these remarks I do not refer to the arrangements of stone mansions in the Broadway or Fifth-avenue, but to houses in which artisans dwell,—men of such means, for instance, as compositors.

R. FREEMAN.

A COURSE OF STUDY.

Sir,—Your correspondent, "An East Indian," wishes to know how he may "gain a practical knowledge of architecture as carried on in this country" without the ordinary course of articleship.

As a practitioner, and the author of several works of some circulation on architecture, building, and cognate matters, I venture to recommend him to attend four days weekly in the office of an architect and surveyor of established reputation, and two days (with a practical man) on buildings in progress. He should also attend the courses of lectures at University or King's Colleges, making ample notes, and devote his early mornings and late evenings to reading and drawing. The rest depends on himself.

EDWARD L. TARBUCK.

Sir,—The letter of "An East Indian" recalls to my mind my struggles and efforts to gain a knowledge of architecture.

My school education was confined to a small country British school, and the highest fee my parents ever paid was 2d. per week. At the age of thirteen I was "bound" to a builder, and from that age till twenty-one I was hard at work driving the tools of a carpenter and joiner on buildings and in workshops, having no idea then that I should ever be an architect, not that there was no wish, but the home finances would not allow of my being articled to an architect, and without that, I then thought such a career impossible. Being, however, very fond of drawing, I used to employ my winter evenings and summer mornings in drawing from nature, from models, and pictures. Some of these in crayon I now have, and imperfect as they are, I value them as forming a link between the present and the past. I had no master,—there was no drawing-master in the place,—nor any science or art class. I usually carried a geometry book in my possession, and studied the problems during unemployed moments.

Having attained my majority, I found that my self-imposed study had raised my ambition, and from a simple desire that gradually developed an untamable passion,—I *would* be an architect.

Now for the struggle. I worked at my trade a part of each week, so as to maintain myself, and the remainder I devoted to drawing plans and the study of architecture. My books were necessarily few, for until twenty-one years of age all the spending-money my parents allowed me was 1s. per week. I managed, however, to supplement that with a little overtime work on my own account. At the best, my stock of books was wofully small, for I had no one to advise me, and no one to offer pecuniary assistance.

This mode of living, part working and part drawing and studying, continued several years, until I persuaded (very unprofessionally, I am afraid) a gentleman to allow me to design a villa for him. This I did, and received 5*l.* for my pains,—having supplied plans, elevations, sections, working drawings, and specifications! The smallness of pay was compensated by the eulogium passed on the building when erected. After this orders came to me, very slowly at first, but gradually increasing in number and importance. I engaged in a host of abominable competitions, of course, and, as a matter of course, failed in nearly all. In fact, I dislike them now as much as ever, for I find that the architect who prepares an honest design,—I mean one that will, or can, be built for the amount stipulated,—stands a very poor chance indeed of acceptance. Flashy designs that cost 50 per cent. more than the architect's estimate are generally the accepted ones. There is this to be said, however, that the incessant practice it gave me developed my designing ability, and the various styles of architecture treated in these designs compelled me to study them thoroughly.

During this uphill work I availed myself of every opportunity for seeing good public buildings, especially our old churches and cathedrals, from which I drank in the spirit, I trust, of the grand old designers, not only of Mediæval, but also of Classic architecture, and so much so that I have learnt to hate the meaningless mixtures,—the "mongrels,"—which are erected in the name of architecture to such an extent in our day. I have also, since boyhood, been a constant reader of the *Builder*, and have reaped immense benefit: its articles and discussions tending to form a true and elevated conception of architecture and an architect's vocation.

The forced application to the practical work during my minority, and for some time after, I found to be of immense value to me, enabling me to surmount practical difficulties that have gone far to make my present position, for now,—after fourteen years of unbroken application,—I have my reward, a considerable practice, and a position and income far beyond the dreams of my boyhood.

My case is probably not parallel with that of "An East Indian," but I would advise him (1) to study thoroughly the characteristics of the various styles and orders from books and buildings; (2) contrive by some means to get an insight into some practical work, some building operations, where the making up and putting together of materials and structural parts will convey to the mind in a more direct and lucid manner the elements of building construction than he can get from books,—not that the books should be discarded.

British Pluck.

THE IRONWORK OF CHURCH WINDOWS.

Sir,—Among the various injuries which churches receive in the process of restoration, there is one which appears hardly to have met with the condemnation it deserves. I allude to the removal of the external ironwork of the windows. There can be no doubt that a system of stanchions and saddle-bars formed part of most Gothic windows, and that they gave solidity to the mullions, were a support to the glass, and, not least of all, added much to the external effect of the window. This is so fully admitted that in most modern churches where details have been attended to the same plan has been followed, and one has often seen attention called, in the accounts given of new churches, to the careful designing of the external ironwork. Scarcely, however, is the church completed, than memorial and other painted glass begins to flow in, and then the carefully-designed ironwork vanishes forthwith, to suit the views of the glass-painters, and apparently without protest on the part of the architect, who, however, is possibly ignorant of what is going on. In the case of old churches, the process is sometimes apologised for on the ground that the corrosion of the metal has damaged the stonework. This, however, hardly seems a sufficient justification for the suppression of so valuable a feature. With regard to the objections of artists, it must be remembered that the designers of glass in old times had the same difficulty to deal with, and that they dealt with it successfully. In fact, I think it may be maintained that the effect of the glass is improved by the general tone given by the shadows of the ironwork. And this is especially the case with modern glass, which so frequently is wanting in subdued tone. Besides, if the ironwork is to be suppressed, why not the mullions and tracery as well, so as to leave a *tabula rasa* for the glass painter? I can speak from experience of the good effect produced in the case of a large Tudor window, the glass of which was painted by Messrs. Hardman, by the retention of the ironwork. I know that the opinion of Sir G. G. Scott was that the ironwork of windows might be made to add to the effect of the glass, and I much wish that our principal architects would speak out and express their disapprobation of its removal, especially in the case of old churches, and in that of their own works as well.

D. D.

THE DRAINAGE PROBLEM.

Sir,—The problem now being discussed with such signal ability at the Royal Institute of British Architects—how to render our present system of house and sewer-drainage innocuous—appears to be as far as ever from solution, so long as engineers insist on concentrating the evil inseparable from the system instead of dealing with that evil before it acquires gigantic dimensions.

From the strictly scientific point of view, there can be no reason why the *excreta* of millions of human beings should be concentrated at one or two outfalls unpurified, and there made to contaminate the estuary of our noblest river; why so many hundreds of miles of sewers, constructed with great skill, should contain noisome streams of filth and corruption, filling our houses with sewer-gas, or (under the modern system of ventilating soil-pipes) poisoning with foulness the atmosphere above and about our houses.

If it were practicable to destroy the evil at its inception, to render innocuous the fæcal matter at the moment it leaves the body, our house-drains would obviously be pure and the contents of our sewers harmless. Although such a desideratum may one day be realised by some genius possessing the science of a chemist and the art of a mechanician, it is, perhaps, difficult of attainment at present, seeing that our soil-pipes are of materials incapable of resisting the action of powerful chemicals. But it might be very nearly attained, if the evil were dealt with at the earliest possible moment, by the introduction of a purifying process daily in every street-sewer. What process should be selected I leave to those who are more accomplished chemists than I to suggest. But assuming, for the moment, the lime-process to be adopted, its application does not seem particularly difficult or impracticable.

Given a street known to contain a certain number of inhabitants, the chemist can tell you to a nicety how many ounces of lime would be necessary to be washed down the road-gulleys of that street daily, so as to render innocuous the sewage discharging from the several house-drains in that street.

If such a process were systematically adopted by the sanitary authority in every street included in our system of drainage, every sewer would be pure, the existence of sewer gas would be impossible, the exhalations from the gulleys and ventilating gratings would be harmless, the air discharged from our soil-pipes and their cowls would be inodorous, and the sewage streaming forth at the outfall would be, if not clean, at least not pestiferous.

Practical difficulties would doubtless arise by the deposit of precipitated matter in the sewers, especially in those of sluggish fall; but such difficulties, in the hands of practical engineers, would doubtless be converted into sources of profit. Huge cesspools or sewers of deposit, to receive such precipitated matter, could be formed, at convenient distances, right and left of, and at a lower level than, the main sewers themselves; such cesspools being mines of wealth to our suburban market-gardeners (who now pay fabulous prices for stable-litter of small fertilising power), and probably contributing not a little to the cost of the purifying process.

I humbly ask you, the pioneer of sanitary science, to permit me to make this suggestion in your pages, in the hope that heads more able, and hands more at leisure than mine, may develop it and bring it to a practical issue.

N. S. Joseph.

QUANTITIES.

Sir,—I have an objection to rushing into print, or to take up the valuable space in your columns unnecessarily; but I cannot refrain from asking your kind permission to give me space to echo the views of "A. C.," as contained in your issue of the 15th ult.

As one of many young men requiring helpful advice, I feel that "A. C." and others like him do great service when they release themselves from the pressure of their daily duties to come forward as experienced pioneers, to light the way of progress to others.

I beg your indulgence to say that many will feel indebted to "A. C." for his remarks, as giving confidence, whether to architects, surveyors, or contractors, especially in the provinces, who would otherwise remain in doubt regarding this vexed question of supplying verified copies of the original dimensions to contractors.

It has been, sir, before now, and within the experience of many, to have been driven into the expense of remeasuring a building, after completion in all its trades, in order to arrive at an accurate result with regard to extras on contract, and this in consequence of the architect or surveyor, as the case may be, refusing to supply contractors with verified copies of the original dimensions. I therefore venture to say, sir, that the possession of a verified copy of the original dimensions by the contractor, at the earliest stage of his contract, is of as much consequence to him as that the quantities should, in common justice to proprietors, architects, and contractors, be made the basis of every contract.

N.

Removal of Snow.—In the parish of Chelsea, under the direction of Mr. Stayton, the surveyor, some 6,000 loads of snow were removed at a cost of about 1,000*l*.

BURSTING OF BOILERS.

Sir,—It is a wonder we have not more kitchen boilers burst through the frozen pipes than we have, owing to the new and defective system of fixing the circulation cistern and pipes in the kitchen, and then raising a single pipe which does not circulate as high or higher than the cold-water supply-tank,—sometimes going through the roof without any protection; the pipe soon gets frozen, thence a burst boiler.

The old plan of fixing the circulating cistern as high as the cold water at the roofing leaves a space at the top for expansion, which can neither freeze nor burst.

Jno. Eldridge, C.E.

THE FROST AND BOILER EXPLOSIONS.

Sir,—A great deal has lately been written on this subject in the daily papers; and having read Mr. P. J. Davies's letter on the so-called "Yankee" system of hot-water tanks in your last issue, and this class of work having come greatly under my notice during the last few weeks, I must say from experience that I have found this (the cylinder system) to be the best. The hot-water cylinder is placed in the kitchen, with flow and return pipes between it and the boiler, where, under ordinary circumstances, it should be impossible for them to freeze. The structure, however, is defective if there is a draw-off from the flow-pipe between the boiler and the cylinder. The object of this system being to keep the boiler and cylinder always full of water,—all draw-offs being taken from the expansion-pipe, and, in the event of this being frozen, it is, of course, *impossible to empty the boiler or cylinder*. To render the system absolutely safe the cylinder should be constructed of copper, as, in the event of its bursting, it will not scatter in fragments, dealing death and destruction around, but will simply burst after the fashion of a paper-bag. A safety-valve should always be placed either upon the cylinder or the boiler, but preferably on the cylinder, it being the weakest part of the system. It will be noticed that it is of vital importance to protect the flow, return, and expansion pipes from the *possibility* of freezing to insure proper working; although, as a rule, this would only be necessary with expansion-pipe, which might possibly be more exposed than the others. If the cylinder should be of iron, a good plan is to make the manholes tight with a piece of light sheet-lead, which would give way to any dangerous pressure. I recommend the spring safety-valve, made by Messrs. Warner, which I have found thoroughly reliable. With the ordinary hot-water tank system, having a considerable length of flow and return pipe between the boiler and cistern, which is usually placed at the top of the house, there is much greater danger of the pipes becoming frozen, and the draw-offs are generally taken from the flow-pipe, and often direct from the boiler, which must be condemned as a very dangerous practice, as the water being withdrawn, a space is left in the boiler to generate steam, which naturally results in an explosion, unless relieved by a safety-valve. The cylinder system has been in use in this country for many years, and was, no doubt, originally exported to America by some of our practical countrymen, the Yankees being, as usual, sharp enough to pick up a good idea, and which they now carry out to perfection in every detail. I must say, in conclusion, that I thoroughly endorse Mr. P. J. Davies's remarks on *outside* soil-pipes, as my experience of this system coincides exactly with his.

John Smeaton.

VERTICAL TUBE VENTILATION.

Sir,—In the print of the interesting lecture by Mr. Edward C. Robins, at the Parkes Museum of Hygiene, on the "Ventilation, Lighting, and Warming of Dwelling Houses," which appeared in your number of the 15th ult., that gentleman was reported to have said, in reference to our air-cleansing water-box in connexion with the vertical tube ventilators:—"but this (viz., the water in the tray of the box) freezes in winter, and at Christmas parties, when most air is required, the chances are it is frozen. This has led to another plan being substituted," &c.

This statement would lead to the inference that if the water freezes the ventilation is impeded or entirely stopped.

The effect of such a remark appearing in print, in a paper of such importance as the *Builder*, is likely to be injurious to us, and we, therefore, desire to point out that should the water in the tray of the water-box freeze, ventilation is not affected in the least, the only inconvenience being that more or less dirt would be admitted by the ventilator according to the state of the atmosphere.

In our experience, however,—and we have the means of constantly watching it,—the water in the box very seldom freezes, because the passage of the air causes the surface to be slightly agitated; but in exceptionally severe weather, such as we have been lately experiencing, we get over the freezing difficulty by mixing a portion of glycerine with the water, which prevents ice forming.

The alternative air-cleansing arrangement or "cleansing-bag" was not designed by us to meet the difficulty Mr. Robins described, but as a cheaper arrangement, and for cases where the proportionately larger opening in the wall which the water-box requires is not admissible.

For the Sanitary Engineering and Ventilation Company,
Henry Carter, Engineer.

The Rowland Hill Memorial.—Sir Frederick Leighton, P.R.A., Mr. Calder Marshall, R.A., and Mr. Woolner, R.A., who acceded to an invitation of the Rowland Hill Memorial Committee to adjudicate upon the various models sent in by competing artists for a statue of Sir Rowland to be erected at the Royal Exchange, have decided that a model, which proved to be the work of Mr. E. Onslow Ford, gives the best promise, but they advise that the artist should be requested, before the commission is intrusted to him, to send in another design on a larger scale.

COLOUR THROUGH STAINED GLASS.

SIR,—The question raised by "A Constant Reader" is most interesting. I observed the fact, very many years ago, of the colours from some ancient glass thrown upon the floor of a church being totally changed, and approaching the complementaries in their character. I think it may be attributed to the fact of the variable thickness of the glass itself, and of the two surfaces of the glass being quite out of parallel with each other in its unevenness. And then, combined with this, there would be some change, probably from the nature of the metallic bases used in its structure acting upon the transmission of the light as through the spectrum.

WILLIAM WHITE, F.S.A.

CHURCH-BUILDING NEWS.

Kensington.—Some alterations to Christ Church, erected from the designs of the late Mr. Ferrey, have been found necessary. When first built, some thirty years since, it was quite in the fields, but is now surrounded by houses. In plan, it consists of nave and aisles, each with a compass roof, and no clearstory. To afford more light, also ventilation, dormer windows, glazed with ornamental lead quarries, in cathedral glass, have been inserted in the nave-roof. Fresh air has been admitted in the aisles on Tobin's principle, and a system for getting rid of the vitiated air will be employed. These works have been carried out by Messrs. Rosser & Russell, under the superintendence of Mr. E. B. Ferrey.

Stockwell.—St. Michael's Church, Stockwell, after being closed twelve weeks, and undergoing considerable alterations and improvements, has been re-opened. The interior arrangements of the church have been completely reversed from the old order of things. A chancel has been formed out of a deeply-recessed apse at the western end. It is part of a polygon, having seven sides, with five lancet windows (one of them is new), four of which were, previous to the alterations, hidden from view by the western gallery and organ. These have been removed, and now the building is open from end to end, giving it much greater apparent length than hitherto. Underneath the chancel windows, the walls of six of the sides have been encased with a quatrefoil screen divided by columns with cups and bases, finished with a moulding on the top and a cornice and base moulding at the bottom. In the centre bay of the chancel a reredos has been fixed. It has three arches, over which runs a cornice, with ball flower ornament. Small dog-teeth run round each arch, and in the spaces forming the spandrels between the arches are two sunk moulded trefoils, with diaper work covering the whole of the other parts of the unoccupied face of the reredos. It is intended hereafter to decorate the three panels as well as the backs of the quatrefoils forming the wall-screen above mentioned. The floor of the chancel has been raised, there being three Portland stone steps at the entrance. The space within the enclosure is laid with ornamental tile paving. The chancel rail and the columns and arches supporting the same are of pitch-pine, stained and varnished. Orders have been given to fill two of the side windows with stained glass. The rest, together with two new windows opened at the west end of the north and south aisles, are glazed with green-tinted cathedral glass. The lower part of the tower, formerly the chancel, has been converted into a porch. A portion only of the internal decorations has been executed consequent upon the damp state of much of the plastering of the walls. The heating apparatus has been completely re-arranged by Messrs. Yates, Haywood, & Co., of Upper Thames-street. Additional gas-lighting has been carried out with brass and iron standards, supplied by Messrs. Jones & Willis, of Great Russell-street. The main works were undertaken by Messrs. MacLachlan & Sons, of Clapham and St. James'-street, Piccadilly, and have been performed by them most satisfactorily. The architect was Mr. Thomas Dashwood, of Bedford-place, and the cost of the works has been about 1,800*l.*

The Alexandra Palace and Park, and Building Estate adjoining, are to be sold by auction on Friday, the 11th inst., at the Mart, by Mr. Robt. Reid. If not sold in one lot, the property will afterwards be put up in seven.

VARIORUM.

"DULCE DOMUM: the Plumber and Sanitary Houses, by S. Stevens Hellyer," published by B. T. Batsford, High Holborn, has been already noticed in our columns as a useful practical treatise on the principles of internal plumbing work, or the best means for effectually excluding noxious gases from houses. Our present purpose is simply to say that a second edition has been published, with additional matter and illustrations. It is written in a pleasant easy manner, and is well entitled to the circulation it is obtaining.——The February number of the *Antiquary* includes an interesting illustrated account by Mr. Alfred Langley of the Remains of the London Wall discovered by him near the Minories.——The *Gentleman's Magazine* for February (Chatto & Windus) contains Dr. Richardson's interesting address "On Garden Schools and the *Kindergarten* System."

Miscellanea.

The Solway Firth Viaduct.—The iron viaduct across the Solway Firth has been seriously injured. This bridge, which is more than a mile in length, and was designed by Mr. Brunlees, C.E., is constructed of iron girders, resting upon nearly 200 piers of iron, each pier consisting of five columns, 40 ft. high, and the whole being braced together by iron lattice work. For several days since the thaw set in the Solway has been very full of ice. On Sunday morning there was a high tide, and when it began to ebb it travelled with such velocity that the blocks of ice were dashed against the bridge with great force, and when day broke it was discovered that five of the piers had been entirely swept away—twenty-five iron pillars having thus been destroyed—and that a few other pillars in other piers had been damaged. Other piers have since given way, and about forty spans have fallen altogether, and many pillars are broken in the portion still standing. This breach is about a quarter of a mile from the English side, and there is another gap nearer the Scotch shore. The central fragment of the viaduct is so unsafe that it cannot be expected to resist the pressure.

Stonyhurst College.—The college of the Jesuits at Stonyhurst is being still further enlarged. Two years ago a new wing was erected at the north end, and now a new wing on the south end is nearly finished, and other important additions have yet to be made before the scheme of enlargement is complete. It is computed that the total expenditure upon the proposed additions will be a little over 120,000*l.*—that is, exclusive of the stone, which is quarried upon the college estate. The architects engaged are Messrs. Dunn & Hansom, of Westminster, and the whole of the sculptured details and modelling is entrusted to Mr. Boddis, of Aston. The contractor for the building is Mr. Thos. Craven, of Blackburn.

The Frame-makers and Gilders' Association, Red Lion-square, was formed in the year 1858, as an offshoot of the Working Men's College, and another attempt to carry into practice the idea of associative work as promulgated by the late Professor Maurice and his friends. The business has been conducted in the same place since that time with varying fortunes, and the recent general commercial depression has seriously affected the Association. After twenty-two years of struggle they appeal for the support of their custom to those interested in co-operative production, and it seems to us they are justified in doing so.

Japanese Art.—A meeting will be held at No. 1, Cleveland-row (opposite St. James's Palace), on Tuesday, February 8, 1881, at eight o'clock p.m., to which all are invited who take an interest in Japanese art, literature, folk-lore, &c. A report will be made by Mr. Pfoundes, of the steps taken by him to organise a Nipon (Japan) Institute. A paper will be read, and discussion invited upon it, entitled "The Popular Literature of Old Japan, and its Influence upon the Artistic Ideals of the People."

Chapel, St. John's Foundation School, Leatherhead.—Some handsome canopied oak "return" stalls to the west entrance-screen have just been added, from the designs of Mr. Edmund B. Ferrey. The chapel was erected about four years since, under the superintendence of the late Mr. Ferrey and Mr. J. H. Good.

The Royal Academy.—At a general assembly held on Friday evening, 28th ult., Messrs. John Brett, painter; Andrew Gow, painter; and William Burges, architect, were elected Associates of the Royal Academy.

TENDERS

For the erection of shops and residential chambers, Gloucester-road, South Kensington. Mr. W. H. Collbran, architect. Messrs. Strudwicke & Mennie, surveyors:—

Gibbs & Flew	£15,945 0 0
Hall, Beddall, & Co	15,500 0 0
Colls & Sons	15,312 0 0
McLachlan & Sons	15,054 0 0
Mowlem & Co.	14,985 0 0
Brass	14 79[illegible] 0 0
Tarrant	14,592 0 0
Braid & Co.	14,536 0 0
Nightingale	13,741 0 0
Bovce	13,600 0 0
Martin, Wells, & Co.	12,680 0 0

For the execution of road and sewer works at Isleworth, for the United Land Company, Limited:—

Botterell	£3,735 0 0
Nowell & Robson	3,108 0 0
Brooker	3,000 0 0
Acock	2,717 0 0
Bath & Blackmore	2,653 0 0
Dyer & Co.	2,593 0 0
McKenzie & Co.	2,560 0 0
Alldred	2 470 0 0
Pizzey	2 380 0 0
Harris	2,370 0 0
Kempling	2,367 0 0
Coker	2,307 0 0
Ford & Co.	2,198 0 0
Brunsden	2,169 0 0
Gross & Paine	1,944 16 8
Seal Bros.	1,835 0 0

For rebuilding the Hope Public-house and two houses and shops adjoining Loampit Vale, Lewisham. Mr. T. S. Archer, architect:—

Symes & Duncan	£4,306 0 0
Freight	3,883 10 0
Jerrard	3,793 0 0
Priestly	3,469 0 0
Macey	3,313 0 0
Chrisp & Tomlin	2,733 0 0
Beale	2,330 0 0

For building model lodging-houses, at Hackney, for Mr. B. Hyams. Mr. Edward Brown, architect:—

Uff	£8,743 0 0
Gould & Brand	8,284 0 0
Thomas & Barrett	7,850 14 9
Baldwin & Wilcock	7,329 0 0
Gill	7,213 0 0
Marr	6,890 0 0
Hawkins	6,852 0 0
Salt	6,780 0 0
Jackson & Todd	6,755 5 0
Royal	6,720 0 0
Shurmur (accepted)	6,354 0 0

For the erection of a new hall at rear of No. 194, Southwark Park-road, for Mr. John Morgan. Mr. E. Crosse, architect:—

White (accepted)	£325 0 0

For alterations and repairs to the Hope Tavern, St. Luke's. Mr. T. W. Barry, architect:—

		Allowances and Old Materials, &c.
Steed	£735 0 0	£23 5 0
Himpy	691 0 0	61 10 0
Griffiths	575 0 0	57 0 0
Alexandra	553 0 0	67 0 0
Cole	545 0 0	—
Harris (accepted)	493 10 0	29 10 0

For warehouse, Maidstone, for Messrs. Youngman & Co. Mr. E. W. Stephens, architect:—

For Foundations and General Work.

Callund & Son, Rochester	£1,320 0 0
Simmonds, Maidstone	1,273 0 0
Cox, Bros., Maidstone	1,243 0 0
Wallis & Clements, Maidstone	1,098 0 0
Avard, Maidstone	1,089 0 0
Vaughan, Bros., Maidstone	997 0 0
Naylar, Rochester	993 0 0

For Ironwork.

Naylar, Rochester	£663 0 0
Handyside & Co., Derby	613 0 0
Weeks & Son, Maidstone	576 0 0
Bells, Garret, & Co., Maidstone	566 0 0
Dawnay & Co., Cannon-street	559 0 0
General Iron Foundry Co., Limited, Thames-street	458 0 0

For the erection of two houses, Queen-street, Ramsgate. Quantities by Mr. Rookwood. Mr. Alfred R. Pite, architect:—

Faulkner	£2,748 0 0
Elgar	2,499 0 0
Wiles	2,473 0 0
Cowell	2,445 0 0
Shrubsole	2,343 0 0
Smith & Sons	2,315 0 0
Home	2,315 0 0
Paramor	2,311 0 0
Price & Richardson	2,290 0 0
Osborn	2,289 0 0
Denne	2,275 0 0
Newby	2,211 0 0
Seal	2,195 0 0
Martin	2,153 0 0

For the erection of school-house, on the Thornton Estate, Thornton Heath, Croydon, for Mr. Wm. Goldsmith. Messrs. Perry & Reed, architects:—

Clemence	£2,190 0 0
Brass	2,165 0 0
Clarke & Bracey	1,989 0 0

For mansion for Mr. John Warren, at Handcross Park, Sussex. Mr. Thos. Chatfeild Clarke, architect:—

Hall, Beddall, & Co. (accepted)	£15,910 11 1

For building four shops in High-street, Stoke Newington, for the Incorporated Society of Licensed Victuallers. Quantities supplied. Mr. H. J. Newton, architect:—

Anley	£5,890	0	0
Perkins	5,672	0	0
Cook	5,533	0	0
Crabb	5,490	0	0
Hobern	5,463	0	0
Lamble	5,423	0	0
Langmead & Way	5,417	0	0
Nightingale	5,391	0	0
Grimwood & Sons	5,366	0	0
Pickersgill	5,363	0	0
Garrud	5,283	0	0
Godden	5,255	0	0
Walker	5,207	0	0
Shurmur	5,166	0	0
Beale	5,047	0	0
Stimpson & Co.	5,020	0	0
Smith	4,950	0	0
Sharp & Mills	4,810	0	0
Mattock Bros.	4,777	0	0
Wood, Hackney (accepted)	4,645	0	0

For erecting the first block of houses at Sandford-lane, for the Incorporated Society of Licensed Victuallers. Quantities supplied. Mr. H. J. Newton, architect:—

Perkins	£7,995	0	0
Lamble	7,773	0	0
Anley	7,690	0	0
Langmead & Way	7,644	0	0
Cook	7,533	0	0
Stimpson & Co.	7,463	0	0
Beale	7,443	0	0
Hobern	7,436	0	0
Nightingale	7,373	0	0
Grimwood & Sons	7,345	0	0
Crabb	7,261	0	0
Shurmur	7,245	0	0
Pickersgill	7,237	0	0
Godden	7,175	0	0
Sharp & Mills	6,830	4	0
Garrud	6,783	0	0
Walker	6,443	0	0
Mattock Bros.	6,377	0	0
Smith	6,210	0	0
Wood, Hackney (accepted)	5,951	0	0

For alterations and additions to Nos. 14, 15, and 16, Duke-street, Reading, for Messrs. Holbrook & Hall. Messrs. Brown & Albury, architects:—

For First Portion of Works.

Simonds, Reading	£2,085	0	0
Higgs, Reading	1,950	0	0
Searle, Reading	1,900	0	0
Woodroffe, Reading	1,775	0	0
Denton, Reading (accepted)	1,634	10	0

For the erection of offices, &c., in Belgrave-street, Reading, for Mr. R. Oakshott. Messrs. Brown & Albury, architects:—

Higgs, Reading	£2,591	0	0
Strong, Reading	2,529	0	0
Simonds, Reading	2,393	0	0
Shephard, Reading	2,392	0	0
Searle, Reading	2,374	0	0
East, Reading	2,322	0	0
Denton, Reading	2,209	0	0
Wernham, Reading	2,187	7	0
Kingerlee, Banbury (accepted)	2,095	0	0

For the erection of new business premises, Redlands, Reading, for Mr. W. Shepherd. Messrs. Brown & Albury, architects:—

Wernham, Reading (accepted)	£1,600	0	0

For taking down and rebuilding the Fox Public-house, Reading, for Messrs. H. & G. Simonds. Messrs. Brown & Albury, architects:—

Wernham, Reading (accepted)	£1,396	10	0

For alterations to the Co-operative Society's Stores, Caversham-road, Reading. Messrs. Brown & Albury, architects:—

Taylor, Reading (accepted)	£299	0	0

For the erection of new business premises in Broad-street, Reading, for Messrs. Thos. Reed & Son. Messrs. Brown & Albury, architects:—

Kingerlee, Banbury (accepted)	£1,195	0	0

For alterations and additions to the Ray Mead Hotel, Maidenhead, for Mr. P. S. Langton. Messrs. Brown & Albury, architects:—

Littleton, Maidenhead	£632	0	0
Woodbridge, Maidenhead	569	0	0
Kingerlee, Banbury (accepted)	495	0	0

For brick sewer for the St. George Sanitary Authority, Bristol. Mr. Wm. Dawson, surveyor:—

Beavan & Brown	£1,715	12	6
Mereweather	1,697	7	0
Neave	1,498	19	0
Monks	1,365	0	0
Parfitt	1,365	0	0
Martin & Thomas	1,328	11	0
Brittan & Froude	1,200	10	0
Calse & Day	1,123	3	0

For alterations and additions to dwelling-house, Salop-road, Welshpool. Mr. R. Hurst, architect. Quantities not supplied:—

Potter, Welshpool	£556	10	0
Pugh, Welshpool	535	0	0
Nevett Bros., Ironbridge	500	0	0
Gethin, Shrewsbury	459	0	0
Bowdler & Co., Shrewsbury	440	0	0
Jones, Welshpool (accepted)	423	0	0

TO CORRESPONDENTS.

Notice.—We have received letters more than sufficient to fill two numbers of the *Builder*, many of which we would willingly print; but are unable to do so for want of space. Correspondents will kindly accept this explanation.—D. R. (the result of some experience as to open soil-pipes was given in our pages recently).—E. P. W. (forwarded).—E. L. G. (thanks; unnecessary).—A. G. (thanks; we do not desire to carry the matter further; we have received over 100 communications on the subject).—T. C. N.—M. & Co.—M. & S.—C. P.—H. C.—W. K.—C. L. L.—D. B.—H. W.—J. H.—E. W. W.—J. W.—R. T.—R. F.—J. S.—R. P. S.—Mrs. L.—C. D.—B. & S.—"Cor unum, via una."—J. H.—W. & K.—F. C.—M. P.—H. P.—H. W.—B. & A.—P. & R.—W. K.—F. & Co.—P. B. L.—A. B. P.—P. H. B.—H. T. W.—Mr. A.—A. J.—W. R.—W. D.—M. & T.—F. W.—W. L.—S. J. J.—W. P. B.—W. Y.—J. & T. T.—B. R.—C. C. H.—W. H.—E. C.—E. B.—M. L.—E. G.—G. N.—N, Bros.—A. C. D. R.—C. B.—D. W.—Messrs. P.—T. E. G.—W. & Co.—X. B. (no).—J. S. G. (next week):—W. R. (next week).

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

NOTICE TO SUBSCRIBERS.

THE INDEX and TITLE-PAGE for Volume XXXIX. (July to December, 1880), were given as a Supplement with the Number of January 15.

A COLOURED TITLE-PAGE may be had, gratis, on personal application at the Office.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING-CASES (Cloth), with Strings, to hold a Month's Numbers, price 2s. each.

THE THIRTY-NINTH VOLUME of "The Builder" (bound) is now ready, price Twelve Shillings and Sixpence.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS TRADE, AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade Advertisements, also for Special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED.

FOUR Lines (about THIRTY words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

REPLIES TO ADVERTISEMENTS,

Addressed Box ——, Office of "The Builder,"

Cannot be forwarded, but *must* in all cases be *called for*, and the Office Receipt produced.

THE CHARGE FOR A BOX IS AS UNDER:—

For "Situations Wanted" Advertisements ..... 3d. per Week.
For all other Advertisements ..... 6d. per Week.

PREPAYMENT IS ABSOLUTELY NECESSARY.

**** Stamps *must not* be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable the Post-office, King-street, Covent-garden, W.C. to

DOUGLAS FOURDRINIER, Publisher,
Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied *direct* from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum, *prepaid*. Remittances payable as above.

Best Bath Stone.
WESTWOOD GROUND,
Box Ground, Combe Down,
Corsham Down,
And Farleigh Down.
RANDELL, SAUNDERS, & CO., Limited,
Corsham, Wilts.—[Advt.]

Doulting Freestone and Ham Hill Stone
of best quality.
Prices, delivered at any part of the United Kingdom, given on application to
CHARLES TRASK,
Norton-sub-Hamdon, Ilminster, Somerset. [Advt.

Bath Stone.
SUMMER DRIED,
STOKE GROUND, and
CORSHAM DOWN,
Supplied in any quantities on the shortest notice.
PICTOR & SONS, Box, Wilts. [Advt.]

Asphalte.
Seyssel, Patent Metallic Lava, and
White Asphaltes.
M. STODART & CO.
Office:
No. 90, Cannon-street, E.C. [Advt.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glehn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. [Advt.]

Whitland Abbey Green Slates.—The peculiar green tint of these stout, durable Slates recommends them for Churches, Mansions, and Public Buildings. Present Orders booked at Reduced Prices.—Apply to Mr. J. MUSCOTT, Clynderwen, R.S.O., South Wales.—[Advt.]

J. Sessions & Sons, Docks, Gloucester, Manufacturers of ENAMELLED SLATE and MARBLE CHIMNEY-PIECES, URINALS, &c. WELSH ROOFING SLATES direct from Quarries to any Station in the Kingdom. Manufacturers of Joinery & Mouldings. [Advt.]

B. J. Hudson & Sons,
MAHOGANY, WAINSCOT, and FANCY WOOD MERCHANTS.
Immense quantities of thoroughly-seasoned Woods, specially adapted for Cabinet and Joinery purposes. Also Veneers of every description always in stock, at lowest possible prices.
WHITFIELD-STREET, LONDON, W., and GREAT PETER-STREET, S.W.

J. L. BACON & CO.
MANUFACTURERS OF
IMPROVED HOT-WATER APPARATUS,
FOR WARMING AND VENTILATING
Private Houses, Churches, Schools, Hospitals, Manufactories, Greenhouses, &c.
OFFICES AND SHOW-ROOMS:—
No. 34, UPPER GLOUCESTER PLACE, DORSET SQUARE, LONDON, N.W.
Illustrated Pamphlet on "Heating" post free for Twelve Stamps.

CHAPPUIS' PATENTS FOR REFLECTING LIGHT.

DAYLIGHT REFLECTORS OF EVERY DESCRIPTION,

ALSO

ARTIFICIAL LIGHT REFLECTORS.

WHY BURN GAS?—CHAPPUIS' REFLECTORS DIFFUSE DAYLIGHT.—They are exclusively adopted by and fitted at Buckingham Palace, all H.M. Government Offices, Houses of Parliament, H.M. First Commissioner of Works, the Metropolitan Board of Works, British Museum, South Kensington Museum, Royal Institution, Guildhall Museum, on board H.M. Ships, also Railway Companies' Offices Hospitals, Institutions, Banks, Insurance Offices, Manufactories, Private Houses and generally from Noblemen's Mansions to Artisans' Workshops. 30,000 in use in London alone. Patronised by leading Architects, Engineers, Contractors, &c., &c.

N.B.—For Prospectuses and Diagrams, address Stamped Envelope to

P. E. CHAPPUIS, Patentee and Manufacturer, 69, FLEET-STREET, LONDON.